Supply Chain Management 4.0: A Literature Review and Research Framework

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Abstract

Purpose – This article presents a review of the existing state-of-the-art literature concerning Supply Chain Management 4.0 (SCM 4.0) and identifies and evaluates the relationship between digital technologies and Supply Chain Management.

Design/methodology/approach – A literature review of state-of-the-art publications in the subject field and a bibliometric analysis were conducted.

Findings – The paper identifies the impact of novel technologies on the different supply chain processes. Furthermore, the paper develops a roadmap framework for future research and practice.

Practical implications – The proposed work is useful for both academics and practitioners as it outlines the pillar components for every supply chain transformation. It also proposes a range of research questions that can be used as a base to guide the future research direction of the field.

Originality/value – This paper presents a novel and original literature review-based study on SCM4.0 as no comprehensive review is available where bibliometric analysis, motivations, barriers and technologies' impact on different SC processes have been considered.

Keywords: Industry 4.0; Supply Chain Management 4.0; Digital supply chain; Novel technologies; SCM 4.0 Framework.

1. Introduction

Digital technologies have deeply changed the way societies exchange information and interact with each other . Technological novelties have altered how people communicate and share information. This novel technology will affect the logistics, supply chains, manufacturing and transportation industries. Therefore, the future of every industry will be opened on innovation and technology. Every industry is going through a rapid transformation that appeared with the fourth industrial revolution.

Changes are rapidly taking place in all business environments and industries. Supply chains can no longer be repositioned overnight to buy, make, move, or sell the right items in the right quantities and the right places as today's marketplace is dominated by intense competition, cost pressures, short-term market demand, and volatile patterns of demand

(Gilaninia et al. 2011). So, it is necessary to envisage a supply chain in which goods, processes, and structures are easily altered in response to changing conditions. Thus, to deal effectively with the increasing challenges, supply chains need to become intelligent . In the literature, several distinctive terms have been used to describe supply chain 4.0, these terms include smart supply chain, digital supply chain or intelligent supply chain. In this article, we use both terms supply chain 4.0 and digital supply chain. Supply chain 4.0 is built amid the new digital age created by the fourth industrial revolution . Industry 4.0 incorporates many technologies, concepts, and methods to enable production systems' autonomy, flexibility, dynamism, and accuracy .

The purpose of the present study is to identify and evaluate the relationship between digital technologies and Supply Chain Management (SCM). Hence, this study is significant due to the following elements: i) SCM 4.0 (Supply Chain Management 4.0) is a complex field ; ii) SCM 4.0 research is a contemporary issue ; and iii) The technological advances made in recent years have had a direct impact on the performance of supply chains (SCs) . Moreover, companies need to understand the necessity of using the latest technology solutions with the physical processes to provide visibility and connectivity in their SCs . Hence, it is important to widely discuss the topic.

The implementation of SCM 4.0 has attracted high attention. Many academics and practitioners have contributed to this field's research, resulting in more than 176 publications. In contrast to this large number of publications, only a few have attempted to evaluate smart SCs or digital SCs . explored the implications of big data for sustainable supply chain management through a systematic literature review. Similarly as other studies, work focused on one technology, i.e. big data. In addition, conducted a literature review to conceptualize the smart supply chain characteristics and formulate and investigate five key research topics that included information management, IT, process automation, advanced analytics, and supply chain integration. In the same context, carried out a review of the literature to contextualize IT in a supply chain 4.0 scenario, focusing on the supply, manufacturing and final consumer stages. Finally, identified key limitations and prospects in DSCs, summarizing prior research and identifying knowledge gaps by providing advantages, weaknesses and limitations of individual methods and developing a framework for future research and practice. In other words, this study presented a literature review on DSCs and their enablers and proposed a framework. However, the study did not define the enablers'

impact on the different SC processes. The reviewed evidence suggested a lack of concise framework for understanding and developing SCM 4.0.

Studies and researches have focused on traditional SCs and I4.0 (Industry 4.0) separately. Thus, studies on SC4.0 are still very recent and available only on a very small scale on bibliographic databases . In this context, no comprehensive review is available where bibliometric analysis, motivations, barriers and technologies' impact on different SC processes have been considered. Furthermore, there are no academic studies that specifically present a framework for the integration of SCM4.0, taking into account risk management in the digital era. To address these gaps in the academic literature, a literature review has been conducted. Thus, the paper intends to fill the gap of past studies regarding the construction of a complete conceptual framework for the implementation of SCM 4.0. It aims to furnish readers with another point of view on SCM4.0 and present the impact of different technologies on SC processes.

This article is organized as follows: in the following section (Section 2), we describe the review methodology used for the study. Section 3 presents the descriptive results. Section 4 illustrates the bibliometric analysis. Section 5 discusses major enabling technologies in SCM4.0 development, research contributions, motivations, and barriers. Section 6 presents the conceptualized proposed framework. And finally, the last section discusses research gaps, implications for practitioners and directions for future research.

2. Research method

A literature review helps authors to evaluate and analyze interesting literature, identify the conceptual content of the field and contribute to theory development . The SC4.0 field emerged only a few years ago and hence related publications are still scattered. Due to the lack of precise keywords that define SCM 4.0, we sorted academic and industrial journals by reviewing their titles, abstracts and manuscripts in traditional and electronic library systems.

To address the research objectives, the review methodology was based on the following content analysis approach and presented in Figure 1 :

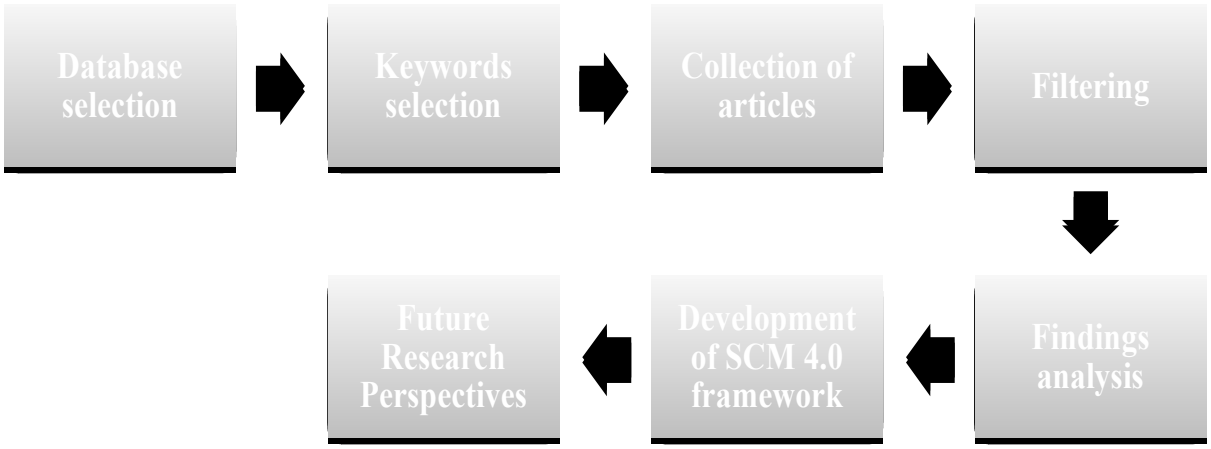

Figure 1. Review methodology

To identify the widest possible scope of scholarly productions, the following databases were used to search relevant publications:

- Scopus (www.scopus.com),
- Elsevier (www.sciencedirect.com),
- Emerald (http://www.emeraldinsight.com),
- Taylor &Francis (http://www.taylorandfrancis.com),
- Springer (https://www.springer.com/gp)
- IEEE (https://ieeexplore.ieee.org/)
- Google Scholar

The keywords and terms used in the searches of the various databases were those that are frequently used to describe and define the use of digital technologies in SCM. The keywords used by the authors are presented in .

The literature review conducted using different research dissemination sources, including scientific journal papers with high impact factors and indexed conferences proceedings. The inquiry procedure was created by first exploring the relevant information sources. The literature review contained literature from 1994 to 2020, seeing that the notion of machine learning, EDI and AI (Artificial Intelligence) were known from 1994. A summary of the method used is shown in .

Table 1. Summary of research methods

Type of analysis	Qualitative
Period of analysis	1994-2020
Keywords used in the research	Smart Supply chain management, Digital Supply chain management, Intelligent Supply chain management, Cyber-physical systems (CPS) & Supply chain management, Big data (BD) & Supply chain management Cloud manufacturing & Supply chain management, Internet of things (IoT) & Supply chain management, Blockchain & Supply chain management, Augmented reality (AR) & Supply chain management, 3DP (Additive manufacturing) & Supply chain management Industry 4.0 & Supply chain management
Total number of articles evaluated	176 articles
Software tools	Qlickview Vosviewer Nvivo 12 Mendeley
Website tools	www.gpsvisualizer.com www.wordart.com

3. Results

This section presents the descriptive statistics based on the analysis of the 176 papers identified through the literature review. The section highlights the literature trend in term of the papers publication over time, the geographical application area, the distribution of reviewed papers by journal and enabling technologies in the field.

3.1 Literature over time

We began by plotting the number of publications in different time periods to observe the evolution of research interest. The aim of reviewing the literature overtime was to examine the year-by-year progress on SCM 4.0 research. It was observed that SCM 4.0 had become a field of research interest among academics and practitioners in the recent past, see Figure 2. The 176 papers identified were published between 1994 and 2020. SCM 4.0 research was limited from 1994 through 2015 as published papers on SCM 4.0 research was at a stable rate of 1, 2 or 4 articles being published per year. From 2015, there was a significant increase to about 60 papers in 2019. It was noticed that 85.23% of the papers were published between 2016 and 2020. The trend of papers on this topic has, therefore, been of

growth in recent years. This shows that SCM 4.0 is an emerging research field due to its increased awareness among researchers and practitioners. Moreover, as an increasing number of organizations are being oriented toward the digitalization of their SCs, research in this field may be expected to continue to growing.

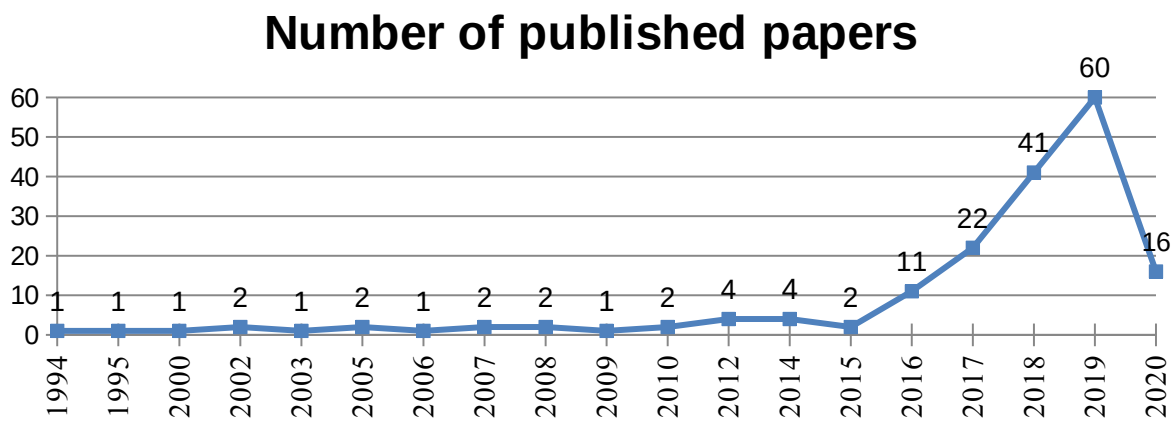

Figure 2. Number of publications per year across the studied period

3.2 Geographical application area

Figure 3 shows the identified papers according to the geographical locations of the authors from 1994 to 2020. The geographical analysis shows that SCM 4.0 research covers 37 countries around the globe. The major research on SCM 4.0 is being carried out in the USA (27 articles), followed by UK (22 articles), France (15 articles), China (14 articles), and Germany (12 articles). The 'others' category is devoted to countries with less than 3 published articles. Based on this analysis, it can be concluded that the concept of SCM 4.0 is extensively researched in developed rather than emerging countries. Indeed, SCM 4.0 research seem to be quite Europe-centric at the moment. The results indicate that the majority of the studies are conducted and published by countries which are well aware of the importance of the digital transformation. It also reflects the important role of developed nations to promote the integration of digital SC. On the other hand, we observed a lack of interest in many underdeveloped and developing countries.

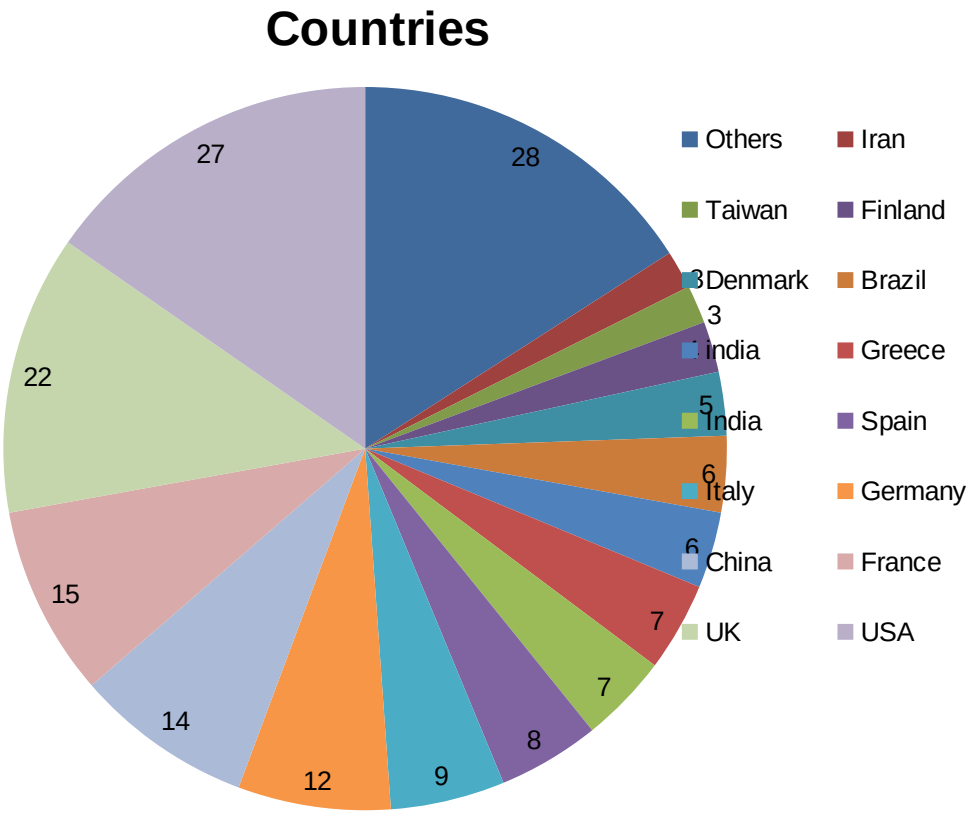

Figure 3. Country-wise publication details

The free website www.gpsvisualizer.com was used to plot data points on the map. Figure 4 5shows the geographical locations of the countries' contribution. The size of the circles 6indicates the proportional contribution of every country. Greater density of contributing 7countries can be seen in Western Europe.

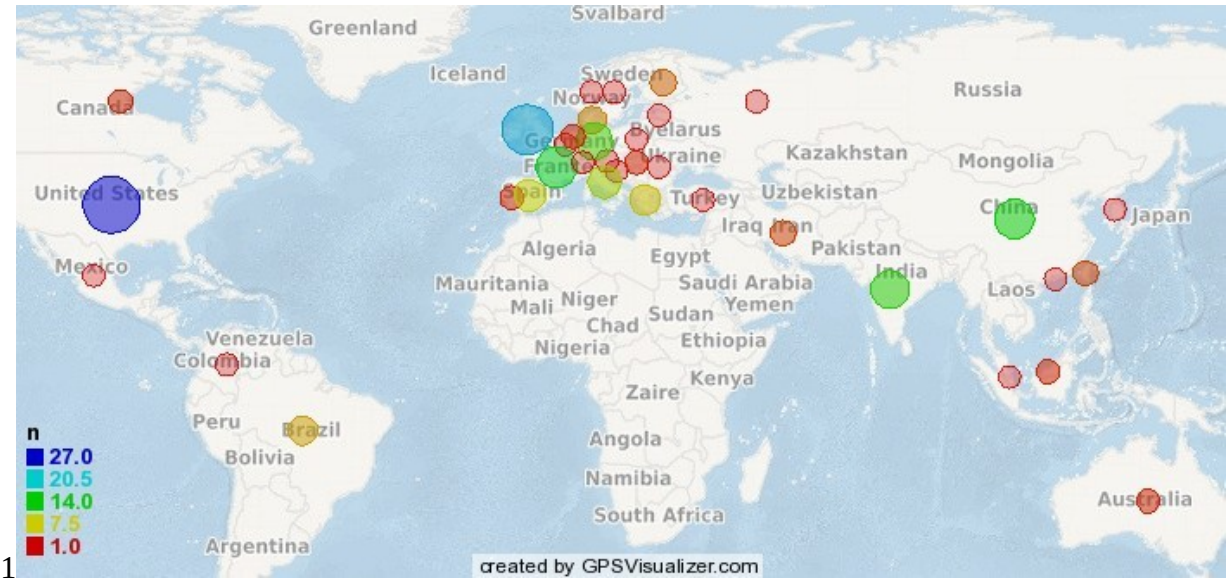

Figure 4. The geographical locations of countries' contribution

3.3 Distribution by journal

The aim of the journal wise distribution analysis was to examine the existing journals which had published SCM 4.0 research articles. The selected 176 articles on SCM 4.0 research were published across 88 journals. The wide range of journal coverage reflects the growth of the SCM 4.0 research area. Figure 5 shows the journals that published SCM 4.0 related articles. The figure only reports journals publishing at least three papers. In order to measure the scientific influence of the journals, we checked the rankings given by the SCImago Journal Rank (SJR) platform. All the listed journals in Figure 5 are listed in the Quartile 1 (Q1) group, except for Procedia Manufacturing (Q2), FAC (Q2) and Procedia Engineering. It can be concluded that research on SCM 4.0 is likely to be published in a range of highly specialized journals (SCM, production, computers industry). Furthermore, the theme is appropriate for publication in journals with a technological focus. This may explain the range of different journals in which SCM 4.0 research papers have been published.

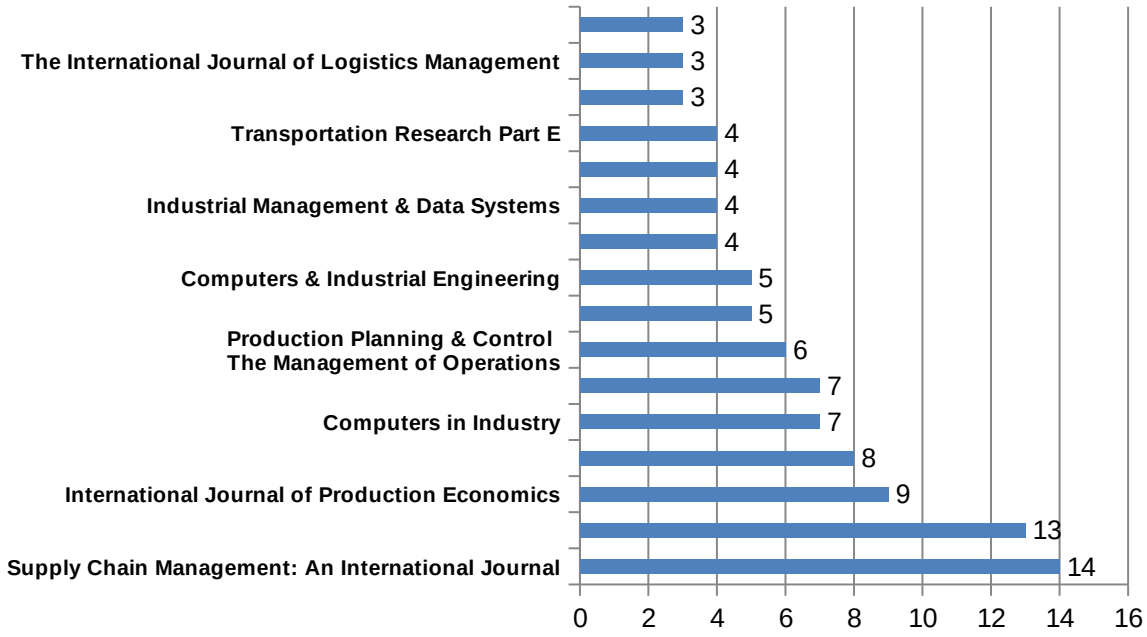

Figure 5. Number of reviewed papers by journal

3.4 Enabling technologies in the field

Figure 6 provides information about enabling technologies. In Figure 6, "Many" represents papers discussing more than one technology. In this case, 22 papers dealt with many technologies, which mean that several digital technologies can be used simultaneously in the SC. On the other hand, "None" represents papers discussing no technology. Indeed, 26 papers discussed the need of having digital SC far away from the technical need. According to Figure 6, the most discussed technology is big data analytics (BDA) (30 articles), followed by blockchain (25 articles), AI (16 articles), and IoT (14 articles). The result indicates that there is an important interest in using different novel technologies, but specially BDA. This can be explained by the fact that multinationals have a strong preference for the implementation of such technology .

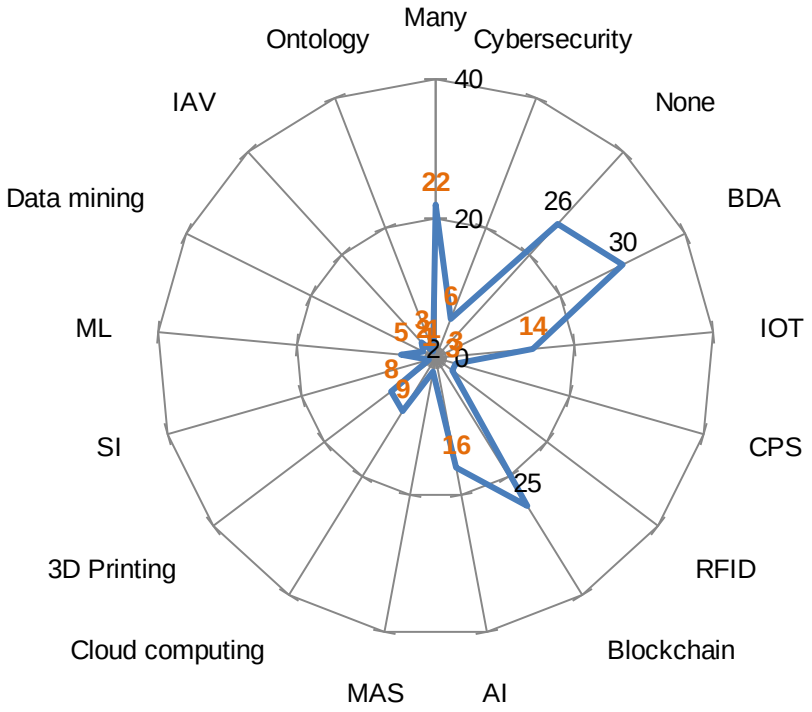

Figure 6. Enabling technologies distribution

4. Bibliometric analysis

To understand how the studied issues were related, four co-occurrence networks and a full-text analysis were developed. The first network was constructed considering co-authorship. The second network illustrated the title co-occurrence terms. The third one consisted of all the keywords with at least four instances while a fourth co-occurrence network was elaborated based on the abstracts of the analyzed articles.

4.1 Co-authorship analysis

To analyze co-authorship, the VOSviewer software was used. It is a tool for creating, visualizing and exploring maps, based on network data. Figure 7 shows the relatedness of items determined based on their number of co-authored documents. The weight of each author determined the size of its label and its circle. In other words, the higher the contribution of the author, the larger its label and circle were. Also, the colors were assigned according to the cluster to which the author belonged. Additionally, the distance between two authors in the visualization indicates the relatedness of authors in terms of co-citation links. Overall, the closer two authors were located to each other, the stronger their relatedness was.

Collaboration between researchers promotes collaboration and productivity within research communities. In this co-authorship of SCM 4.0 work, the authors' minimum number of publications was set at 2 in VOSviewer. The largest set of connected authors consisted of 49 authors out of 459, see Figure 7. It highlights that collaboration and communication in this field are not well established as all clusters are disconnected. Moreover, many of the 49 items in the network were not connected to each other. The largest set of connected items consisted of 9 items, see Figure 8. It shows that authors can be divided into three clusters. In the blue cluster, research groups are working on blockchain and SCM, the red group is working on big data SCM and the green group is working on internet of things, sustainable data-driven supply chains and blockchain and SCM. We observe that there is a weak link between the authors' clusters due to the novelty of the subject, which included a lack of continuity in ensuring research works in this field. Therefore, co-authoring publications can greatly promote innovative studies and academic exchange. In addition, collaboration between authors in the digital supply chain domain should be enhanced, in particular for those coming from different industries or countries.

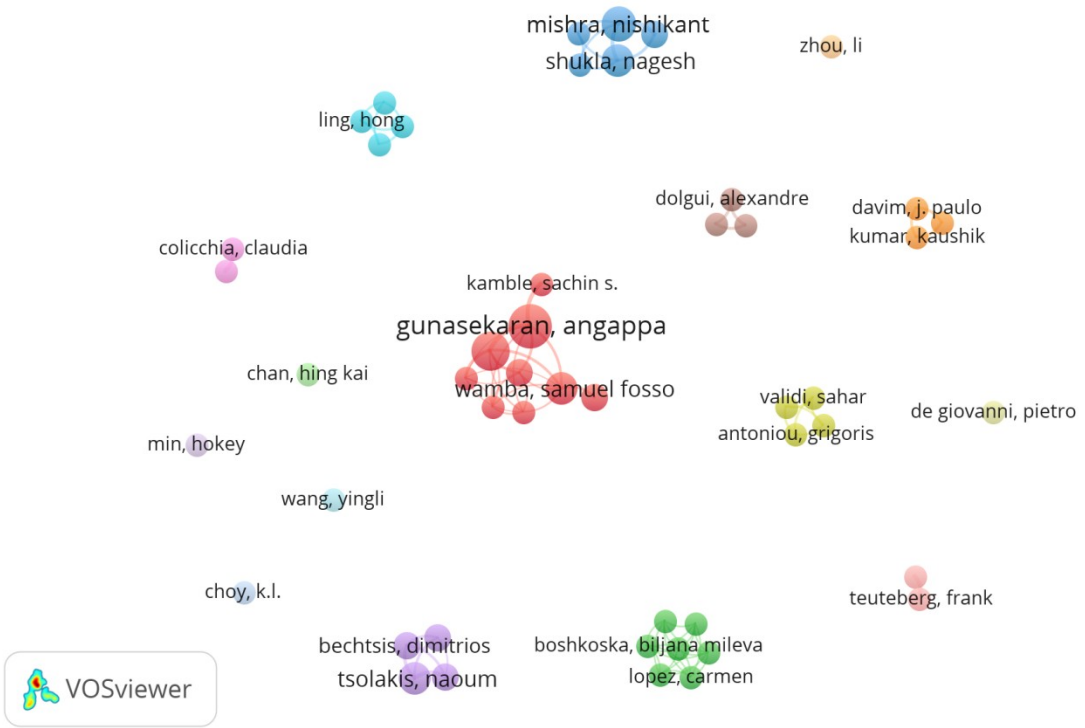

Figure 7. Co-authorship network

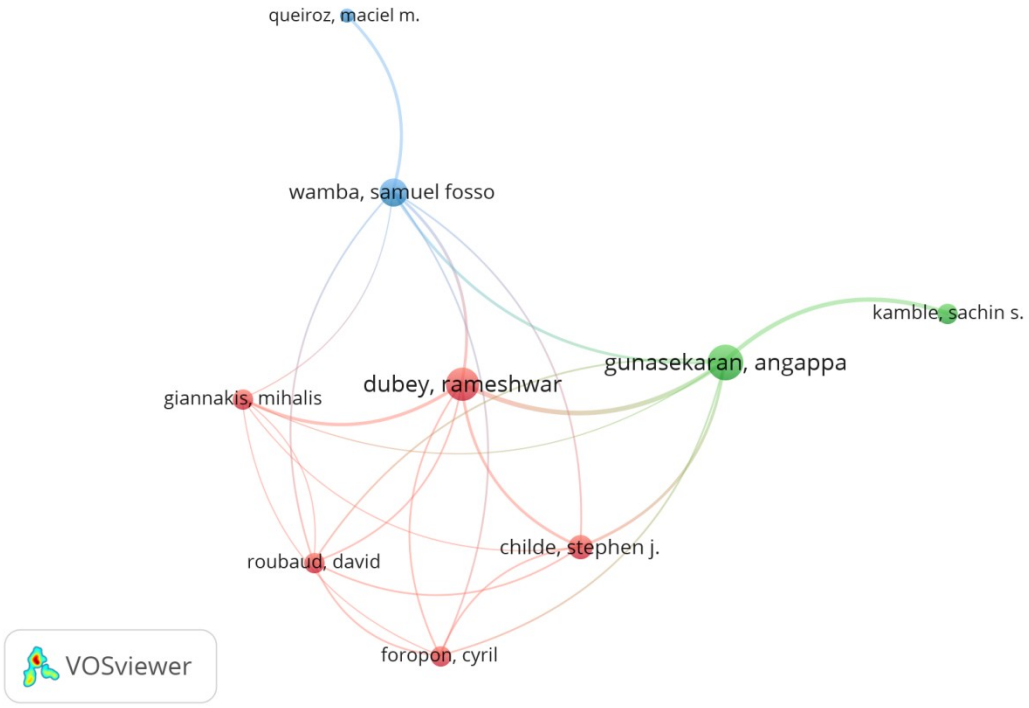

Figure 8 : The largest set of connected authors

4.2 Title occurrence

The most commonly used words in the titles of papers related to SCM4.0 were determined through the free open-source online software www.wordart.com. We found that 'Supply chain' was the most common word used 157 times, followed by 'managing', 'I4.0', 'technology', 'data', and 'digital' used 29 times. Those common words were mapped in the cloud words map presented in Figure 9. This figure illustrates the most common words in bigger fonts, whereas the less common words are represented in smaller fonts. The title can be used to describe the work, to position it in context, or to provide a summary of its contents. It helps to evoke the reader's attention. We can observe that the titles of the reviewed paper are addressing SCM coupled with I4.0, technology, or data. In other words, the title's overview indicates the potential of the mixed topic of SCM and novel technologies for the ongoing involvement of the researchers' community.

Figure 9. Title most common words

4.3 Abstract occurrence

The abstract co-occurrence represented the relatedness of abstract words determined based on their number of documents in which they simultaneously occur. Figure 10 presents the co-occurrence network elaborated based on the abstracts of the papers analyzed. The minimum number of occurrences of a term was 20. Of the 3,310 terms, 31 met the threshold and 23 were filtered. Figure 10 illustrates 4 clusters, i.e the red, blue, green, and yellow. The green cluster includes ‘SCM’, ‘big data’, ‘internet’, ‘IoT’, ‘data’, ‘information’, ‘application’ and ‘product’. The blue cluster includes ‘blockchain’ and ‘technology’. Thus, in the abstract, the presence of digitalization words was found. It can be deduced that there is a focus on the ‘data’ or ‘information’ aspects of supply chains. In other words, the data helps organizations develop new growth opportunities which may explain the interest of studying the use of big data in the SCM.

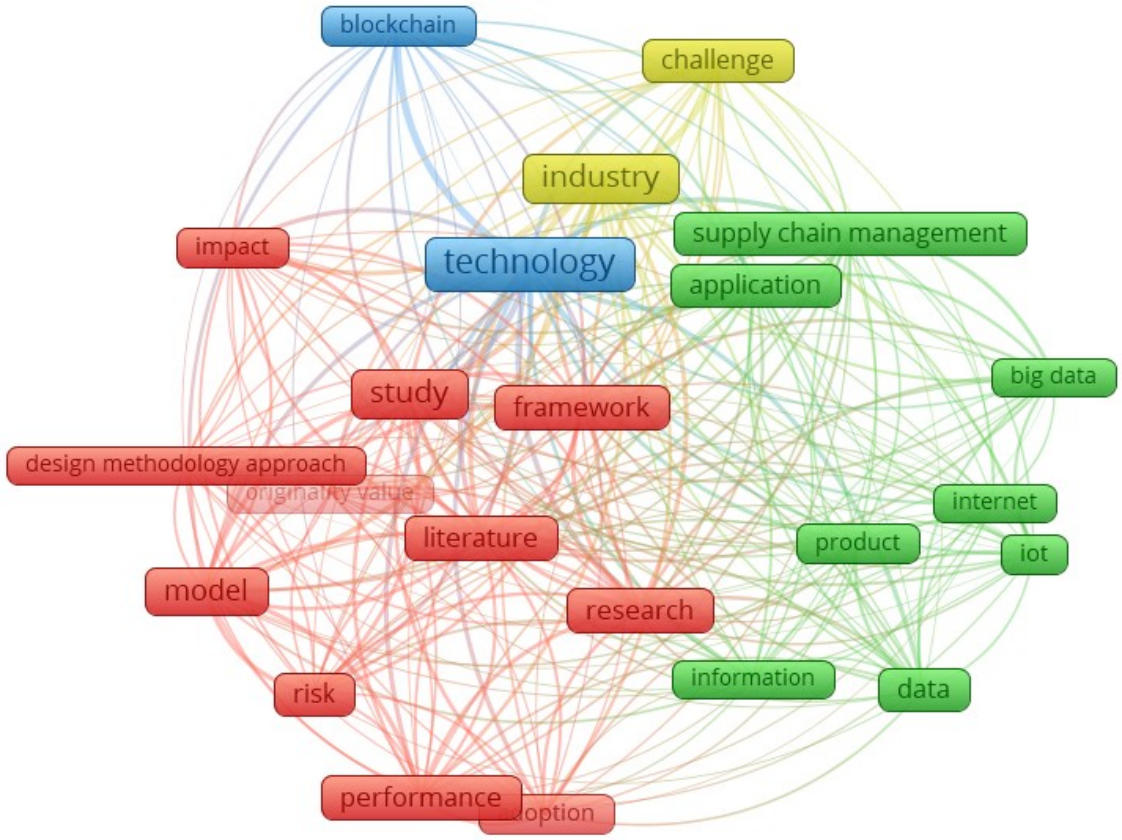

Figure 10. The abstract co-occurrence network

4.4 Keywords occurrence

Keywords represent the key content of the papers. The purpose of the keyword review was to identify important research topics in SCM 4.0 studies and direction in the current research domain. The determined keywords were those with at least 5 occurrences. Of the 483 keywords, 29 met this criterion. The keywords analysis identified three clusters, see Table 2. With the cluster density visualization, the density of keywords was displayed separately for each cluster of items. The color of a point in the visualization was obtained by mixing the colors of different clusters as presented in Error: Reference source not found11. Thus, the weight given to the color of a certain cluster was determined by the number of items belonging to that cluster in the neighborhood of the point.

The red cluster relates to the diversity of technologies related to the supply chain management topic. Moreover, sustainability and risk management are highly used topics, which indicates the importance of these notions in digital supply chain integration and logistics. Also, 'literature review' belongs to this cluster. The blue cluster highlights the importance of terms like supply chain, value chain and 3D printing (additive manufacturing). Finally, the green cluster shows the relevance of industry 4.0, resulting in smart manufacturing thanks to

technologies like blockchain and AI. In addition, the digitalization of operations can result in disruption. Thus, it is necessary to enhance supply chain resilience.

Table 2.Keywords clusters

Cluster 1	Cluster 2	Cluster 3
3DP	CC	AI
Additive manufacturing	IoT	Operation management
Supply chain	BD	Blockchain
Value chain	Machine learning	Disruption
	Risk management	Industry 4.0
	Supply chain integration	Smart manufacturing
	Literature review	
	Logistics	
	SCM	Supply chain resilience
	Sustainability	Supply chain risk management

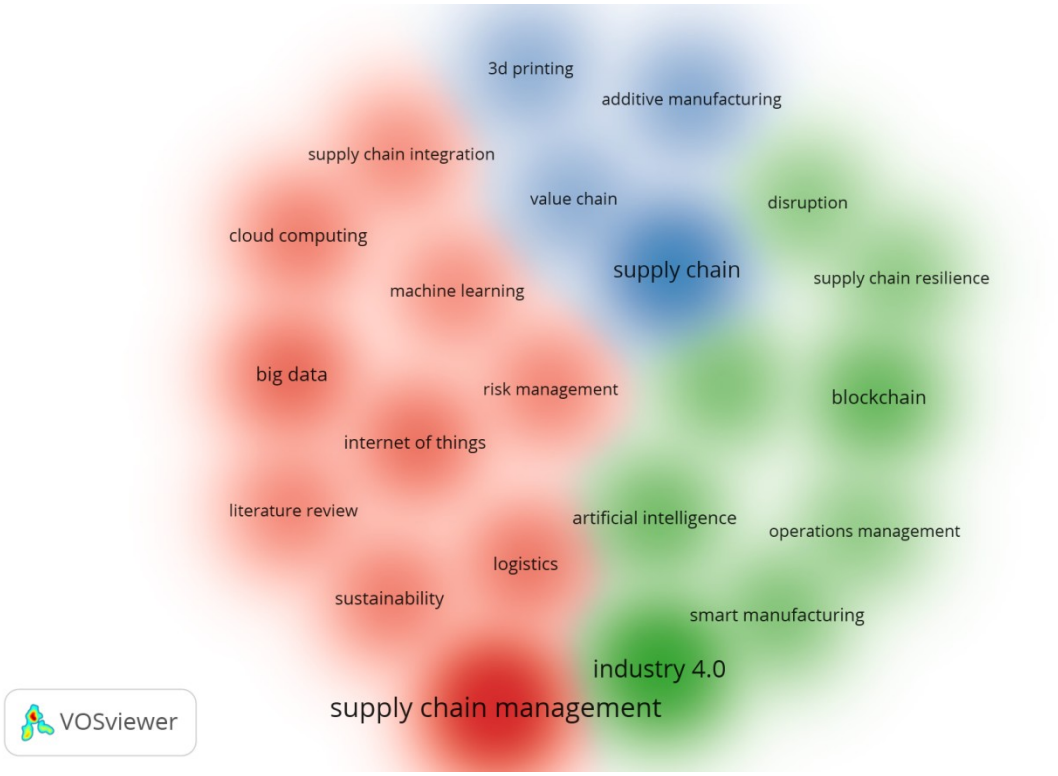

Figure 11 Keywords cluster density visualization

4.5 Full-text terms co-occurrence

The study used Nvivo 12 software to identify the most frequent words (limited to the first 50 words) used in the literature. As part of the literature review, a word cluster analysis was conducted. The highlighted terms have a relevant number of occurrences, which show their

frequency in the scientific discourse in the SCM 4.0 field. It revealed that the word ‘supply’ was the most frequently used, followed by the words ‘chain and ‘managing’. It is relevant to observe that the articles exhibiting the term ‘big data’, ‘blockchain’ and ‘technology’ are associated with a higher number of occurrences, showing the ability of a combined discussion to build on the continued interest of the research community. Therefore, based on this analysis, it can be seen that the words describing the novel era of digitalization, e.g. ‘IoT’, ‘digital’, ‘smart’, etc. do not have a significant presence compared to the other words, see Error: Reference source not found12. The modest presence of those words can be attributed to the newness of the studied field and the lack of authorship collaboration.

Figure 12. Full texts most common words

5. Discussion

In this section, the selected SCM 4.0 works and results of the previous analyses are discussed. The most relevant technologies for SCM 4.0 are analyzed based on the findings of such analyses. Their impact on SC processes is also discussed.

5.1 Discussion of previous works

To date, globalization has led to greater income, primarily due to the rapid growth of earnings. However, as supply chains become smarter, businesses will also be able to handle performance issues. In this context, argued on the necessity of having smart SCs. defined, established and analyzed eleven factors that determine the implementation of smart manufacturing information and digital technologies using Interpretive Structural Modeling. mapped out the contextual interrelationships between factors, which led to a thorough understanding of smart manufacturing transformation processes, and conditions that facilitate the manufacturing digitalisation in the Industry 4.0 era. Moreover, studied the impact of digitalisation and Industry 4.0 on the ripple effect and disruption risk control analytics in the supply chain. They provide a research framework combining the impact of digitalisation on SC management (SCM) and the impact of SCM on the ripple effect control. Furthermore, explored how multinational companies from five industries have adapted to SC 4.0. They focused on three main emerging technologies, i.e. big data, cloud computing and 3D printing. They also summarised the issues that have been debated concerning Supply Chain 4.0 in a graphical framework.

Our analyses showed that four works are presenting a literature review on SCM 4.0 . Büyüközkan and Göçer (2018) present a literature review for DSCs and their enablers and proposed a framework for their integration. In this context, various authors have established different frameworks for SCM 4.0. presented a conceptual framework that led to the development of a survey instrument investigating the use of novel digital technologies in the core management of supply chains using SCOR model. proposed a framework for IT-enabled supply chain integration. conceptualized a model providing a novel and comprehensive overview of the new concepts and components driving nascent and current DSCs.

Some authors have addressed the sustainability challenge through SCM 4.0. For example, studied the impact of digital transformation technologies on sustainable supply chains. However, this work focused only on the social and environmental dimensions. On the other hand, studied the impact of sustainability on supply chain 4.0 performance. Nevertheless, these two studies are not enough to have a robust overview of the mutual

impact of sustainability and SC 4.0. In addition, risk management in the context of SCM 4.0 has not been extensively studied. However, the digitalization of SC risk management has been treated by several authors, e.g. and . In other words, they have focused on how to have smart risk management.

It can be seen from the studied literature that the focus on SCM 4.0 has been mainly on its enablers. The contributing existing articles to SCM 4.0 and its technologies that focus on SCs are classified in Appendix I.

5.2 Enabling technologies on SCM

Different technologies or techniques can be used to manage SCs 4.0. These technologies include CPS, IoT, CC (cloud computing), blockchain, BD, AR, and AI . Table AII, 1 in Appendix II presents the different definitions of these technologies:

All the technologies above have an impact on the SC. BD has positive effects on supply chain performance and organizational performance . It can influence the production network by advancing operational brilliance, cost reserve funds and consumer loyalty. SC supervisors can use BD to improve the relationship of their organizations with customers and suppliers and upgrade replenishment by advancing stock management . BD is useful in terms of helping managers to understand suppliers performance . BD provides better forecasts, increase SC visibility and strong SC relationships . Currently, the use of BD in production planning and control is in the development stage . BD is valuable for the SC , especially in demand forecasting, procurement, inventory and reverse logistics.

IoT in SCs help to build up the efficiency of warehouse operations, reduce unnecessary processes and gain time in inventorying . IoT makes the management of SCs more effective and efficient. For example, IoT enables improvements in cost-saving, inventory accuracy and product tracking . IoT can also participate in the improvement of products, services, customer experience and security .

The main areas of efficient use of CC are logistics management, database management, and demand forecasting and planning. The assimilation of CC would encourage cooperation between SC members. It would enhance the sharing of resources and information. It would also improve the adaptability to demand changes .

CPSs are the basis of I4.0 as they enable the digital integration of physical processes using integrated computers and networks to monitor and control such physical processes. In this context, intelligent industries can be created by these systems . CPS contribute to the optimization and management of inventory and production control .

The emergence of blockchain technology introduces a new way of thinking about supply chain management . Blockchain is already contributing to remodeling traditional business models and creating new opportunities across the entire supply chain . Due to blockchain technology, following and sharing data becomes quicker, and adaptability can be ensured immediately . Through a blockchain empowered inventory network, firms can accomplish real-time exchanges . BT (Bitcoin) assumes a critical job as it tends to be utilized to counteract security breaks while reinforcing SC availability. BT is hack-safe, carefully designed to offer automatic traceability . Blockchain technology enables the enhancement and tracking of goods and passengers in real-time, from their origins and throughout the overall SCM. It helps to eliminate disclosure and accountability problems .

3D printing is used to create engineering prototypes. It can enable the mass customization of goods on a large scale . 3DP contributes to reducing excessive inventory stocking. As a result of the 3DP flexibility, the number of suppliers can be reduced and the quality of products increased. Similarly, product variety, shorter lead time, efficiency and an increase in inventory control can be achieved .

AR alludes to the layering of PC reproduction models over the physical design of a current environment. AR improves the effectiveness of the present SCs processes. Most normal types of AR include a type of glass, visual presentation for a wearer to use during the time spent expanding profitability and execution. Expanded reality is being utilized to give a feeling of scene recognition amid request picking forms .

RFID provides real-time identification, real-time material flow and tracing, helping to increase data quality . RFID technology's important promise is to reduce costs and provide a wealth of information that helps companies understand, predict, and respond to customer demand more effectively .

AI techniques are used for scheduling in cellular manufacturing systems . Furthermore, AI through machine vision and autonomous applications are used in industrial fields. By using predictive technologies that model future scenarios and also develop a deep understanding of the interactions in the SC drivers, their performance will be enhanced .

5.3 SCM 4.0

To help overcome the challenges associated with volatility and uncertainty, organizations need a digital supply chain built on visibility, sustainability, and better customer experiences. In other words, transparency in the supply chain helps to reduce the

complexity of its processes via improving the visibility of upstream and downstream supply chain operations . So, the entry of CPS in supply chains is one of the most revolutionary changes in the fourth SCM revolution. The meaning of 'smart' is the capacity of an item to perceive without anyone else's interruption the reason to be accomplished, to function admirably, and to adaptably react to any changeability . SC4.0 is an advanced framework with interconnected procedures that grows from detached applications to a wide relationship, coordinated and effective between phases of the SC .

The experienced digital transformation has provided a platform from which businesses all over the world can become more efficient from end-to-end. But with that, there is a growing expectation from every SC process to become more efficient, more reliable, and more transparent. Thus, smart SCs leverage data and digital technology's ability to attain world-class cost, capital and client satisfaction result. It creates competitive advantages and seizes fresh company possibilities. Additionally, smart SCs connect customers, businesses and distributors to generate transparency, reliability and effectiveness through the smart use of data across the demand to the supply value chain. Thanks to the wise use of digital technologies, the following points will be assured according to :

- Fully integrated SCs: End-to-End (E2E) transparency, dynamically adjustable synchronized network and blockchain global transaction management ;
- Holistic intelligent E2E decision-making: Real-time data/predictive analysis, Real-time performance and real-time process management;
- Automated no-touch SC: Instantaneous supply, and demand planning, automated, smart manufacturing, warehousing, logistics and customer service.

5.3 SCM 4.0 implementation drivers and barriers

In order to remain competitive and have flexibility in their SCs, companies need to leverage autonomous technologies. As shown by Table AII, 2 located in Appendix II, these motivations drive companies to implement SCM4.0. Thus, to improve systems' performance and worker productivity, companies prefer to use novel technologies. Making digital investments to decrease expenses and eliminate SC complexity drives income development. Hence, companies take into consideration customer satisfaction, relationships with partners, and production quantities as significant drivers in the SC procedures to implement digitalization.

The advantages of SCM4.0 integration are consistent, but at the same time, it also creates certain difficulties and obstacles. As presented in Table AII, 3 (Appendix II), companies that have chosen or have already applied digital technologies are facing challenges such as the cost of technical set-up and long development time. Lack of coordination and absence of urgency are also important inhibitors to digitalisation implementation. Leaders could support their staff with continuing assistance and a clear strategic vision to overcome these barriers by emphasizing the importance of novel technologies for the SC.

6. Framework for the development of SCM 4.0

The SCM 4.0 subject is difficult to comprehend because it includes distinct activity flows, elements, features, and role players. The original framework displayed in Figure 13 conceptualizes a roadmap for better understanding of the topic of SCM4.0. Based on the literature review, the proposed framework decomposes the connection between distinct parts within digital SCs. The framework was created by defining key topics in SCM 4.0, reviewing current SCM categorizations and analyzing existing frameworks. This framework can be used as a guide for researchers and practitioners in the field. The purpose of the framework is to integrate dominant topics and ideas within SCM4.0. The following components were considered for its development:

- SCM
- Digital technologies
- Digitalization
- Risk management

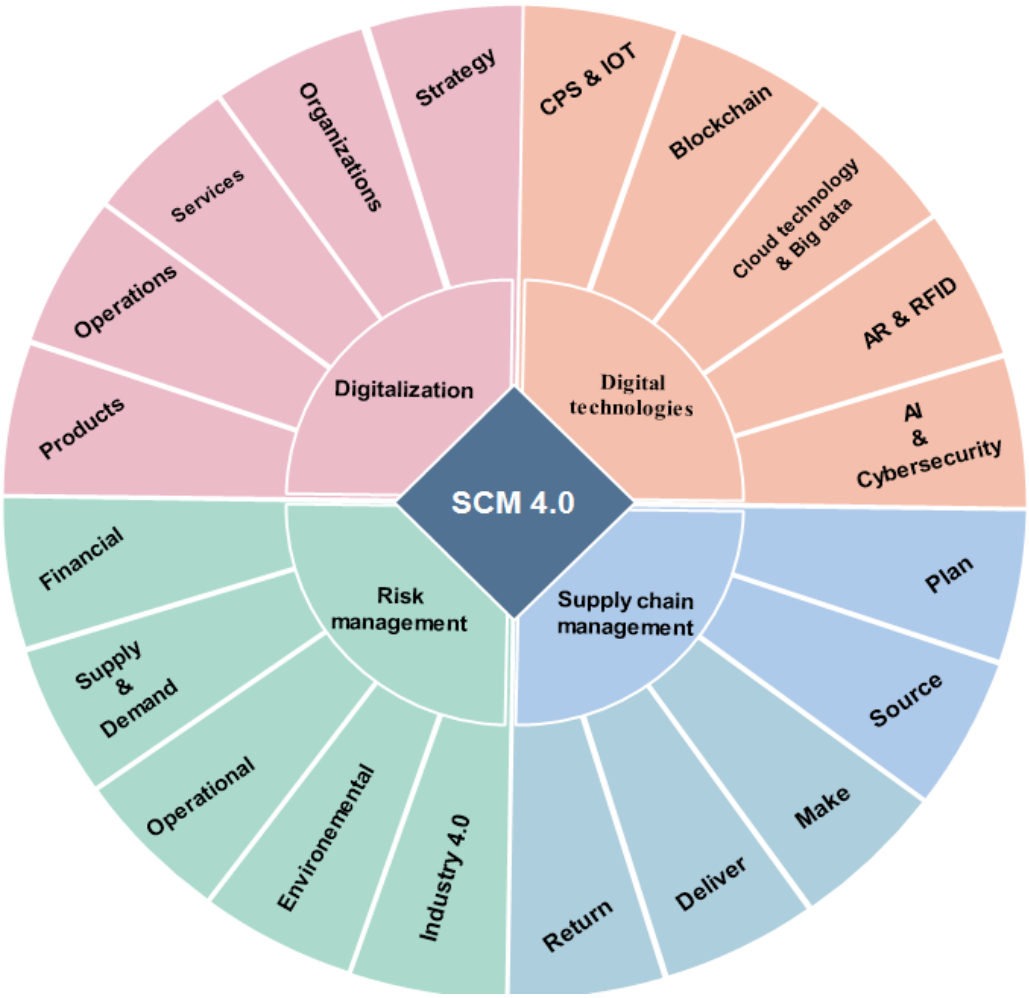

Figure 13. Framework for the development of SCM4.0

6.1 SCM

The role of any SC focuses on moving equipment, finished products, capital, and other resources from location to location. SCs consist of various operations, exchanging time, money, data, or physical equipment for some other value unit. In other words, SCs typically involve end-to-end information, products and services, and cash flows . Hence, managing these elements impacts the competitive positioning of an organization in fields such as product pricing, requirements for working capital, speed-to-market, and perception of service. Organizations are exploring creative ways to streamline their SCs to satisfy the changing requirements of consumers. Traditional SCs have been affected in several respects by dramatic technological and digital innovations, such as higher computing power and reduced general expenses, including reducing transaction costs and increasing innovation linked to the manufacturing processes themselves.

SCOR was developed and established in 1996 by the Supply Chain Council (SCC) as a reference model for the design and enhancement of SCs . The SCOR model is a well-known

framework that divides the processes of the SC into “plan, source, make, deliver, return and enable” (APICS, 2015). This model is widely accepted in practice, mainly because of its ability to link processes with performance metrics and was therefore used to carry out process-centric views of the literature reviews related to the SC . Table 3 illustrated the impact of each technology in the SC process, presented in Section 6.2, according to the SCOR model.

6.2 Digital technologies

Digital technologies assist organizations to solve different problems, create new opportunities, gain competitive advantage , and enhance firms’ performance . Applying novel technologies in traditional linear SCs with a discrete movement of “plan, source, make, deliver and return” changes SCs from a static to a dynamic succession . This move from linear, consecutive production network activities to an interconnected, open arrangement of supply tasks is important for organisations to contend later on.

As each supply process turns out to be increasingly proficient and associated, the SC breaks down into a dynamic, incorporated supply arrange. SC4.0 is the reform of SCs using I4.0 technologies. These technologies, which emerged in the 21st century, are mainly introduced by companies in high-income countries. These firms look to maintain competitive SCs.

1Table 3. Technologies' impact on SC with SCOR model LINK Excel.Sheet.12 "C:\\Users\\PC\\Desktop\\Nouveau Feuille de calcul Microsoft Excel.xlsx"
2"Feuil1!L1C1:L12C12" \a \f 5 \h * MERGEFORMATX

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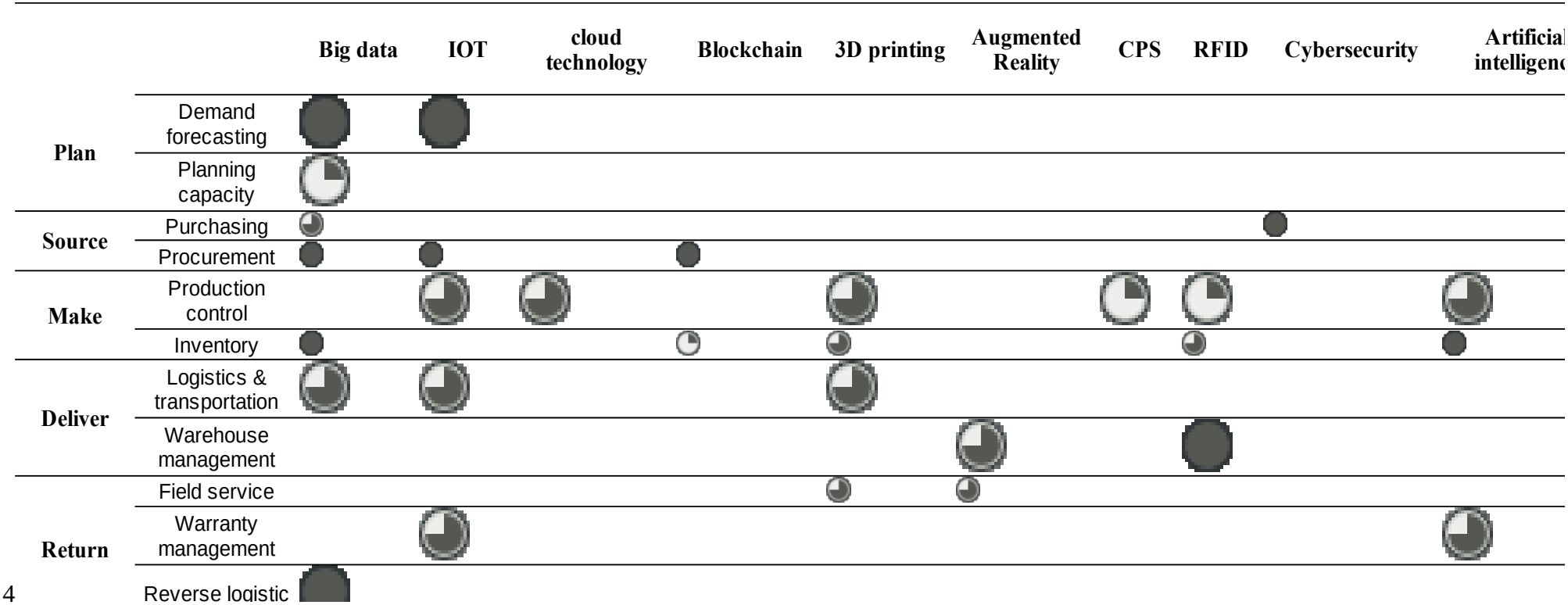

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1SC4.0 includes deploying modern instruments like the IoT, BDA, Autonomous Robotics, etc
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3{"formattedCitation":"(B\\uc0\\u252{}y\\uc0\\u252{}k\\uc0\\u246{}zkan and G\\uc0\\u246{}\\
4uc0\\u231{}er, 2018a; Nasiri et al., 2020)","plainCitation":"(Büyüközkan and Göçer, 2018a;
5Nasiri et al., 2020)","noteIndex":0},"citationItems":[{"id":1383,"uris":["http://zotero.org/users/
6local/VzJHFBGK/items/4LXR5PQH"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/
74LXR5PQH"],"itemData":{"id":1383,"type":"article-journal","abstract":"Suppliers, partners,
8companies and dealers in supply chains do use, generate and share information with others.
9These associations lead to a multitude of challenges and opportunities within the supply
10chains. A Digital Supply Chain (DSC) is a smart, value-driven, efficient process to generate
11new forms of revenue and business value for organizations and to leverage new approaches
12with novel technological and analytical methods DSC is not about whether goods and
13services are digital or physical, it is about the way how supply chain processes are managed
14with a wide variety of innovative technologies, e.g. unmanned aerial vehicles, cloud
15computing, and internet of things, among others. Recent literature highlights the importance
16of DSC and many industrial researchers discuss its applications. This article reviews the
17stateof-the-art of existing DSC literature in detail from both academic and industrial points of
18view. It identifies key limitations and prospects in DSC, summarizes prior research and
19identifies knowledge gaps by providing advantages, weaknesses and limitations of individual
20methods The article also aims at providing a development framework as a roadmap for future
21research and practice.","container-title":"Computers in
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23Computers in Industry","language":"en","page":"157-177","source":"DOI.org
24(Crossref)","title":"Digital Supply Chain: Literature review and a proposed framework for
25future research","title-short":"Digital Supply
26Chain","URL":"https://linkinghub.elsevier.com/retrieve/pii/S0166361517304487","volume":"97
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32the approach required to achieve competitive advantages in the digital supply chain.
33Moreover, the study examines how digital transformation of companies can fuel smart
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35to 280 Finnish small and medium-sized enterprises (SMEs) show that digital transformation
36of the companies alone cannot enhance relationship performance, and that it needs to be
37coupled with smart technologies to achieve this goal. This means that smart technologies

fully mediate the relationship between digital transformation and relationship performance.","container-title":"Technovation","DOI":"10.1016/j.technovation.2020.102121","ISSN":"01664972","journalAbbreviation":"Technovation","language":"en","page":"102121","source":"DOI.org (Crossref)","title":"Managing the digital supply chain: The role of smart technologies","title-short":"Managing the digital supply chain","URL":"https://linkinghub.elsevier.com/retrieve/pii/S0166497220300110","author":[{"family":"Nasiri","given":"Mina"},{"family":"Ukko","given":"Juhani"},{"family":"Saunila","given":"Minna"},{"family":"Rantala","given":"Tero"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-parts":[["2020",3]]},"label":"page"}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Büyüközkan and Göçer, 2018a; Nasiri et al., 2020). It transforms the SCM model from a linear model ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"a2fd108sd9u","properties":{"formattedCitation":"(Garay-Rondero et al., 2019)","plainCitation":"(Garay-Rondero et al., 2019)","noteIndex":0},"citationItems":[{"id":1249,"uris":["http://zotero.org/users/local/VzJHFBGK/items/ND2Q38QN"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/ND2Q38QN"],"itemData":{"id":1249,"type":"article-journal","abstract":"Purpose – The purpose of this paper is to present a conceptual model that defines the essential components shaping the new Digital Supply Chains (DSCs) through the implementation and acceleration of Industry 4.0. Design/methodology/approach – The scope of the present work exposes a conceptual approach and review of the key literature from 1989 to 2019, concerning the evolution and transformation of the actors and constructs in logistics and Supply Chain Management (SCM) by means of examining different conceptual models and a state-of-the-art review of Industry 4.0's concepts and elements, with a focus on digitization in supply chain (SC) processes. A detailed study of the constructs and components of SCM, as defined by their authors, resulted in the development of a referential and systematic model that fuses the inherent concepts and roles of SCM, with the new technological trends directed toward digitization, automation, and the increasing use of information and communication technologies across logistics global value chains.","container-title":"Journal of Manufacturing Technology Management","DOI":"10.1108/JMTM-08-2018-0280","ISSN":"1741-038X","issue":"ahead-of-print","journalAbbreviation":"JMTM","language":"en","source":"DOI.org (Crossref)","title":"Digital supply chain model in Industry 4.0","URL":"https://www.emerald.com/insight/content/doi/10.1108/JMTM-08-2018-0280/full/html","volume":"ahead-of-print","author":[{"family":"Garay-Rondero","given":"Claudia Lizette"},{"family":"Martinez-Flores","given":"Jose Luis"},{"family":"Smith","given":"Neale R."},{"family":"Caballero Morales","given":"Santiago Omar"},{"family":"Aldrette-Malacara","given":"Alejandra"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-

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2master/csl-citation.json"}(Garay-Rondero et al., 2019), see REF _Ref15658581 \h Figure 13,
3to a more integrated model ADDIN ZOTERO_ITEM CSL_CITATION
4{"citationID":"NQjhtYuZ","properties":{"formattedCitation":"(Garay-Rondero et al.,
52019)","plainCitation":"(Garay-Rondero et al., 2019)","noteIndex":0},"citationItems":
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244.0","URL":"https://www.emerald.com/insight/content/doi/10.1108/JMTM-08-2018-0280/full/
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26{"family":"Martinez-Flores","given":"Jose Luis"},{"family":"Smith","given":"Neale R."},
27{"family":"Caballero Morales","given":"Santiago Omar"},{"family":"Aldrette-
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29parts":[["2019",12,12]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/
30master/csl-citation.json"}(Garay-Rondero et al., 2019) where data flows are omnidirectional,
31REF _Ref15658581 \h Figure 14. In other words, technological developments are about the
32conversion of linear SCs into dynamically linked and ongoing digital supply network,
33transforming the exchange and sharing of data and resources between companies.

Figure 13. Traditional SC

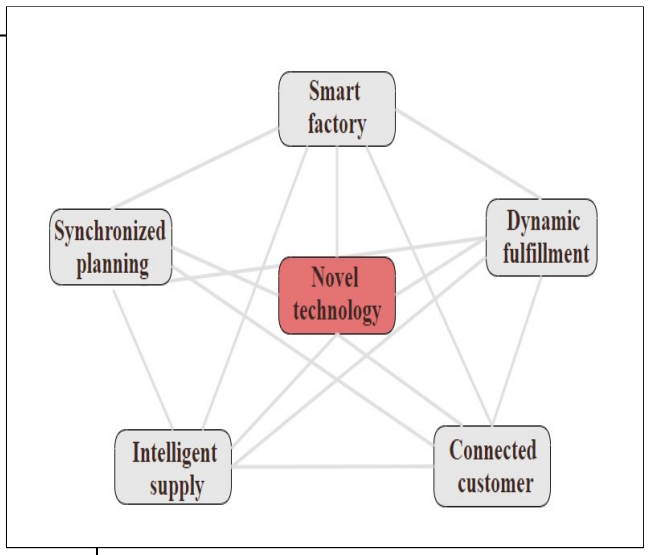

Figure 14. Digital SC

Successful organisations should define the appropriate digital projects aligned with their objectives, learn quickly from their pilot implementation, and be determined and capable of reaching scale. Therefore, to face the double challenge of attracting talent and enhancing employees working on traditional SCs, managers should:

- Look to diversify their recruitment strategy;
- Develop an atmosphere that facilitates learning;
- Develop a clear career route for staff;
- Give talent the authority to conduct change;
- Develop appropriate programs for acquiring new skills.

6.3 Digitalization

Companies are determined to introduce products, technological and administrative improvements to generate added value for clients as well as for themselves. Digitalization can generate possibilities to achieve these values in order to improve SC procedures ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"aeknmcad6n","properties": {"formattedCitation":"(Nasiri et al., 2020; Patnayakuni et al., 2002)","plainCitation":"(Nasiri et al., 2020; Patnayakuni et al., 2002)","noteIndex":0},"citationItems":[{"id":1222,"uris":["http://zotero.org/users/local/VzJHFBGK/items/BUVX7M2X"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/BUVX7M2X"],"itemData":{"id":1222,"type":"article-journal","abstract":"This study investigates the approach required to achieve competitive advantages in the digital supply chain. Moreover, the study examines how digital transformation of companies can fuel smart technologies, leading to improved relationship performance. The results of the survey

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SCM revolution is nowadays taking place, and each company needs to rethink how to enforce and do it.

In the field of data leadership, digitization has already altered the way we operate ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"a25vobhodkn","properties":{"formattedCitation":"(Singh, 2003)","plainCitation":"(Singh, 2003)","noteIndex":0},"citationItems":[{"id":1245,"uris":["http://zotero.org/users/local/VzJHFBGK/items/HWF9IHWU"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/HWF9IHWU"],"itemData":{"id":1245,"type":"article-journal","container-title":"Communications of the ACM","DOI":"10.1145/903893.903943","ISSN":"00010782","issue":"9","journalAbbreviation":"Commun. ACM","language":"en","page":"243","source":"DOI.org (Crossref)","title":"Emerging technologies to support supply chain management","URL":"http://portal.acm.org/citation.cfm?doid=903893.903943","volume":"46","author":[{"family":"Singh","given":"Nitin"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-parts":[["2003",9,1]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Singh, 2003). Implementing digital SCs is hampered by heavy investment and significant digitization-related challenges ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"lZfR4kqn","properties":{"formattedCitation":"(Ardito et al., 2019)","plainCitation":"(Ardito et al., 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/3z8fgdQ4","uris":["http://www.mendeley.com/documents/?uuid=5175808c-4d07-4b92-bd97-ad7e735f352c"],"uri":["http://www.mendeley.com/documents/?uuid=5175808c-4d07-4b92-bd97-ad7e735f352c"],"itemData":{"DOI":"10.1108/BPMJ-04-2017-0088","ISSN":"1463-7154","abstract":"Purpose – The purpose of this paper is to present a comprehensive picture of the innovative efforts undertaken over time to develop the digital technologies for managing the interface between supply chain management and marketing processes and the role they play in sustaining supply chain management-marketing (SCM-M) integration from an information processing point of view. Design/methodology/approach – Patent analysis and actual examples are used to carry out this study. In detail, first, the authors identify the subset of enabling technologies pertaining to the fourth industrial revolution (Industry 4.0) that can be considered the most relevant for effective SCM-M integration (i.e. Industrial Internet of Things, Cloud computing, Big Data analytics and customer profiling, Cyber security). Second, the authors carry out a patent analysis aimed at providing a comprehensive overview of the patenting activity trends characterizing the set of digital technologies under investigation, hence highlighting their innovation dynamics and applications. Findings – This research provides insightful information about which digital technologies may enable the SCM-M integration. Specifically,

the authors highlight the role those solutions play in terms of information acquisition, storage and elaboration for SCM-M integration by relying on illustrative actual examples. Moreover, the authors present the organisations more involved in the development of digital technologies for SCM-M integration over time and offer an examination of their technological impact in terms of influence on subsequent technological developments. Originality/value – So far, much has been said about why marketing and supply chain management functions should be integrated. However, a clear picture of the digital technologies that might be adopted to achieve this objective has yet to be revealed. Thus, the paper contributes to the literature on SCM-M integration and Industry 4.0 by highlighting the enabling technologies for the Industry 4.0 that may particularly serve for managing the SCM-M interface from an information processing perspective.","author":[{"dropping-particle":"","family":"Ardito","given":"Lorenzo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Petruzzelli","given":"Antonio Messeni","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Panniello","given":"Umberto","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Garavelli","given":"Achille Claudio","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Business Process Management Journal","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2019"]]},"page":"323-346","title":"Towards Industry 4.0","type":"article-journal","volume":"25"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Ardito et al., 2019). Due to the dangerous nature of digital SC systems, focal companies are required to adapt the external settings and multiple external parties, often beyond their control ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"JwPd74n7","properties":{"formattedCitation":"(Xue et al., 2013)","plainCitation":"(Xue et al., 2013)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/BTEpH6N5","uris":["http://www.mendeley.com/documents/?uuid=6ac57ed0-1ab8-4562-a323-6b7aeecac501"],"uri":["http://www.mendeley.com/documents/?uuid=6ac57ed0-1ab8-4562-a323-6b7aeecac501"],"itemData":{"DOI":"10.2753/mis0742-1222300110","ISSN":"0742-1222","abstract":"Firms face significant risk when they adopt digital supply chain systems to transact and coordinate with their partners. Drawn upon modular systems theory, this study proposes that system modularity mitigates the risk of adopting digital supply chain systems and therefore motivates firms to digitize more of their supply chain operations. The study theorizes how the risk-mitigating effect of system modularity can be enhanced by the allocation of decision rights to the IT (information technology) unit. The main logic is that IT managers with more domain IT knowledge can better utilize their knowledge in decision making to achieve effective system modularity. We tested these theoretical propositions

using a survey study of Chinese companies and found empirical support. We also found that the allocation of decision rights to the IT unit does not directly mitigate the perceived risk of digital supply chain systems, which highlights the role of decision allocation to the IT unit as a key moderator in risk mitigation. The study generates theoretical and practical implications on how IT governance and system modularity may jointly mitigate risk and foster supply chain digitization.","author":[{"dropping-particle":"","family":"Xue","given":"Ling","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zhang","given":"Cheng","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ling","given":"Hong","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zhao","given":"Xia","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Management Information Systems","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2013"]]},"page":"325-352","title":"Risk Mitigation in Supply Chain Digitization: System Modularity and Information Technology Governance","type":"article-journal","volume":"30"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Xue et al., 2013).

The digitalization of SC brings out so many advantages. It offers both flexibility and efficiency ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"a1b0atf80sl","properties":{"formattedCitation":"(B\\uc0\\u252{}y\\uc0\\u252{}k\\uc0\\u246{}zkan and G\\uc0\\u246{}\\uc0\\u231{}er, 2018a; Wong et al., 2020)","plainCitation":"(Büyüközkan and Göçer, 2018a; Wong et al., 2020)","noteIndex":0},"citationItems":[{"id":1383,"uris":["http://zotero.org/users/local/VzJHFBGK/items/4LXR5PQH"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/4LXR5PQH"],"itemData":{"id":1383,"type":"article-journal","abstract":"Suppliers, partners, companies and dealers in supply chains do use, generate and share information with others. These associations lead to a multitude of challenges and opportunities within the supply chains. A Digital Supply Chain (DSC) is a smart, value-driven, efficient process to generate new forms of revenue and business value for organizations and to leverage new approaches with novel technological and analytical methods DSC is not about whether goods and services are digital or physical, it is about the way how supply chain processes are managed with a wide variety of innovative technologies, e.g. unmanned aerial vehicles, cloud computing, and internet of things, among others. Recent literature highlights the importance of DSC and many industrial researchers discuss its applications. This article reviews the stateof-the-art of existing DSC literature in detail from both academic and industrial points of view. It identifies key limitations and prospects in DSC, summarizes prior research and identifies knowledge gaps by providing advantages, weaknesses and limitations of individual methods The article also aims at providing a development framework as a roadmap for future

research and practice.","container-title":"Computers in Industry","DOI":"10.1016/j.compind.2018.02.010","ISSN":"01663615","journalAbbreviation":"Computers in Industry","language":"en","page":"157-177","source":"DOI.org (Crossref)","title":"Digital Supply Chain: Literature review and a proposed framework for future research","title-short":"Digital Supply Chain","URL":"https://linkinghub.elsevier.com/retrieve/pii/S0166361517304487","volume":"97","author":[{"family":"Büyüközkan","given":"Gülçin"},{"family":"Göçer","given":"Fethullah"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-parts":[["2018",5]]}},"label":"page"},{"id":1227,"uris":["http://zotero.org/users/local/VzJHFBGK/items/ZG8L6QN8"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/ZG8L6QN8"],"itemData":{"id":1227,"type":"article-journal","abstract":"This study aims to investigate the effects of relative advantage, complexity, upper management support, cost, market dynamics, competitive pressure and regulatory support on blockchain adoption for operations and supply chain management among Small-Medium Enterprises (SMEs) in Malaysia. Unlike existing studies that employed linear models with Technology Acceptance Model or United Theory of Acceptance and Use of Technology that ignores the organisational and environmental factors, we adopted the Technology, Organisation and Environment Framework that covers the technological dimensions of relative advantage and complexity, organisational dimensions of upper management support and cost and environmental dimensions of market dynamics, competitive pressure and regulatory support. Empirical data from 194 SMEs were investigated and ranked using a nonlinear non-compensatory PLS-ANN approach. Competitive pressure, complexity, cost and relative have significant effects on behavioural intention. Market dynamics, regulatory support and upper management support were insignificant predictors. SMEs often lack resources for technological investments but faces same requirements for streamlining business processes to optimise returns and blockchain presents a viable option for SMEs' sustainability due to its features of immutability, transparency and security that have the potential to revolutionise businesses. This study contributes new knowledge to the literature on factors that affect blockchain adoption and justifications were discussed accordingly.","container-title":"International Journal of Information Management","DOI":"10.1016/j.ijinfomgt.2019.08.005","ISSN":"02684012","journalAbbreviation":"International Journal of Information Management","language":"en","page":"101997","source":"DOI.org (Crossref)","title":"Time to seize the digital evolution: Adoption of blockchain in operations and supply chain management among Malaysian SMEs","title-short":"Time to seize the digital evolution","URL":"https://linkinghub.elsevier.com/retrieve/pii/S0268401219304347","volume":"52","author":[{"family":"Wong","given":"Lai-Wan"},{"family":"Leong","given":"Lai-Ying"},

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2{"family":"Ooi","given":"Keng-Boon"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-
3parts":[["2020",6]]}},"label":"page"}],"schema":"https://github.com/citation-style-language/
4schema/raw/master/csl-citation.json"}(Büyüközkan and Göçer, 2018a; Wong et al., 2020). 5New technology for instrumentation, interconnection, and intelligence can create robust, 6secure, and sustainable SCs required by companies. Smarter SCs would use smart modelling 7to analyze only needed information and make sense of it ADDIN ZOTERO_ITEM 8CSL_CITATION {"citationID":"Q92ASwTt","properties":{"formattedCitation":"(Tjahjono et al., 92017)","plainCitation":"(Tjahjono et al., 2017)","noteIndex":0},"citationItems":
10[{"id":"fJ2LYHh2/6MXIsM7M","uris":["http://www.mendeley.com/documents/?uuid=c13ef2d8-
11312b-4b9f-b0c8-55a8ff977d6c"],"uri":["http://www.mendeley.com/documents/?
12uuid=c13ef2d8-312b-4b9f-b0c8-55a8ff977d6c"],"itemData":{"DOI":"10.1016/
13j.promfg.2017.09.191","ISBN":"9404601624","ISSN":"23519789","abstract":"The term
14‘Industry 4.0’ was coined to mark the fourth industrial revolution, a new paradigm enabled by
15the introduction of the Internet of Things (IoT) into the production and manufacturing
16environment. The vision of Industry 4.0 emphasizes the global networks of machines in a
17smart factory setting capable of autonomously exchanging information and controlling each
18other. This cyber-physical system allows the smart factory to operate autonomously. For
19instance, a machine will know the manufacturing process that needs to be applied to a
20product, what variation to be made to that product etc., so that the product can be uniquely
21identifiable as an active entity whose configuration and route in the production line is unique.
22As the collaboration between suppliers, manufacturers and customers is crucial to increase
23the transparency of all the steps from when the order is dispatched until the end of the life
24cycle of the product, it is therefore necessary to analyze the impact of Industry 4.0 on the
25supply chain as a whole.","author":[{"dropping-
26particle":"","family":"Tjahjono","given":"B.","non-dropping-particle":"","parse-
27names":false,"suffix":""},{"dropping-particle":"","family":"Esplugues","given":"C.","non-
28dropping-particle":"","parse-names":false,"suffix":""},{"dropping-
29particle":"","family":"Ares","given":"E.","non-dropping-particle":"","parse-
30names":false,"suffix":""},{"dropping-particle":"","family":"Pelaez","given":"G.","non-dropping-
31particle":"","parse-names":false,"suffix":""}],"container-title":"Procedia
32Manufacturing","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"page":"1175-
331182","publisher":"Elsevier B.V.","title":"What does Industry 4.0 mean to Supply
34Chain?","type":"article-journal","volume":"13"}],"schema":"https://github.com/citation-style-
35language/schema/raw/master/csl-citation.json"}(Tjahjono et al., 2017).

The most relevant benefits are increased flexibility, quality standards, efficiency and productivity. On the other hand, BDA, cloud technology, cybersecurity, IoT, miniaturization of electronics, RFID, robotics, drones and nanotechnology can also be threats for organisations ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"abhceb4cqj","properties":{"formattedCitation":"(Liotine, 2020; Lorite et al., 2017a)","plainCitation":"(Liotine, 2020; Lorite et al., 2017a)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":1506,"uris":["http://zotero.org/users/local/VzJHFBGK/items/4I8L76VZ"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/4I8L76VZ"],"itemData":{"id":1506,"type":"chapter","container-title":"Technology in Supply Chain Management and Logistics","ISBN":"978-0-12-815956-1","language":"en","note":"DOI: 10.1016/B978-0-12-815956-9.00008-9","page":"143-167","publisher":"Elsevier","source":"DOI.org (Crossref)","title":"Unlocking digital innovation: guiding principles for driving digital technology in the supply chain","title-short":"Unlocking digital innovation","URL":"https://linkinghub.elsevier.com/retrieve/pii/B9780128159569000089","author":[{"family":"Liotine","given":"Matthew"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-parts":[["2020"]]}},"label":"page"},{"id":1390,"uris":["http://zotero.org/users/local/VzJHFBGK/items/SHPZ7BPF"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/SHPZ7BPF"],"itemData":{"id":1390,"type":"article-journal","abstract":"In order to reduce food waste and meet the needs of the demanding modern consumer regarding the quality of food items, it is crucial to monitor the supply chain and storage conditions of perishable food products. Considering this scenario, temperature plays an important role on food safety and quality during storage and supply. In this work, a critical temperature indicator (CTI) based on a solvent melting point is developed. Furthermore, the present CTI working principle is improved by the use of microfluidics technology. As final result, a novel and functional CTI-smart sensor which combines irreversible visual color changes and radio frequency identification (RFID) technologies is achieved. Such CTI integrated to a RFID tag provides a unique advantage to monitor the supply chain in real time by the simple use of a RFID reader in strategic points.","container-title":"Journal of Food Engineering","DOI":"10.1016/j.jfoodeng.2016.06.016","ISSN":"02608774","journalAbbreviation":"Journal of Food Engineering","language":"en","page":"20-28","source":"DOI.org (Crossref)","title":"Novel, smart and RFID assisted critical temperature indicator for supply chain monitoring","URL":"https://linkinghub.elsevier.com/retrieve/pii/S026087741630214X","volume":"193","author":[{"family":"Lorite","given":"Gabriela Simone"},{"family":"Selkälä","given":"Tuula"},{"family":"Sipola","given":"Teemu"},

1{"family":"Palenzuela","given":"Jesús"},{"family":"Jubete","given":"Elena"},
2{"family":"Viñuales","given":"Ana"},{"family":"Cabañero","given":"Germán"},
3{"family":"Grande","given":"Hans J."},{"family":"Tuominen","given":"Jarkko"},
4{"family":"Uusitalo","given":"Sanna"},{"family":"Hakalahti","given":"Leena"},
5{"family":"Kordas","given":"Krisztian"},{"family":"Toth","given":"Geza"}],"accessed":{"date-
6parts":[["2020",7,22]]},"issued":{"date-parts":[["2017",1]]}},"label":"page"}],"schema":"https://
7github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Liotine, 2020;
8Lorite et al., 2017).

9 Furthermore, smarter supply chains advantages do normally translate into an increase in
10products' price ADDIN ZOTERO_ITEM CSL_CITATION
11{"citationID":"59EXoAR3","properties":{"formattedCitation":"(ElMaraghy,
122019)","plainCitation":"(ElMaraghy,
132019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/YRHBfe61","uris":["http://
14www.mendeley.com/documents/?uuid=0fc87d86-65cd-4c0a-b292-95964d3c14e2"],"uri":
15["http://www.mendeley.com/documents/?uuid=0fc87d86-65cd-4c0a-b292-
1695964d3c14e2"],"itemData":{"DOI":"10.1016/
17j.promfg.2018.12.002","ISSN":"23519789","author":[{"dropping-
18particle":"","family":"ElMaraghy","given":"Hoda","non-dropping-particle":"","parse-
19names":false,"suffix":""}],"container-title":"Procedia Manufacturing","id":"ITEM-1","issued":
20{"date-parts":[["2019"]]},"page":"3-9","publisher":"Elsevier B.V.","title":"Smart changeable
21manufacturing systems","type":"article-journal","volume":"28"}}],"schema":"https://github.com/
22citation-style-language/schema/raw/master/csl-citation.json"}(ElMaraghy, 2019). An increase
23in the amount of digitalized data and the expansion of internet companies means that the risk
24of attacks on their databases is also greater. Hackers may intend to modify, steal or delete data
25ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"lVDcx9UX","properties":
26{"formattedCitation":"(Ghadimi et al., 2018)","plainCitation":"(Ghadimi et al.,
272018)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/wPq4p6aM","uris":["http://
28www.mendeley.com/documents/?uuid=d98c36dc-a029-460d-a4ce-e87a047d764f"],"uri":
29["http://www.mendeley.com/documents/?uuid=d98c36dc-a029-460d-a4ce-
30e87a047d764f"],"itemData":{"DOI":"10.1016/j.cie.2018.10.050","ISBN":"03608352
31(ISSN)","ISSN":"03608352","abstract":"Advancements in information and communication
32systems offer immense opportunities for supply chain intelligence and autonomy establishing
33stepping stones for Industry 4.0 supply chains (SCs). As a crucial SC decision, sustainable
34supplier evaluation and selection process have been addressed abundantly in the previous
35literature. However, this process has not yet been realized within Industry 4.0 SCs where
36interconnection, real-time information transparency, technical assistance and

decentralization of members of a physical system (i.e., supply chain members) are regarded as the main design principles. To narrow the identified gap, a Multi-Agent Systems (MASs) approach is proposed for addressing sustainable supplier evaluation and selection process to provide a proper communication channel, structured information exchange and visibility among suppliers and manufacturers. Furthermore, the application of MASs in this process and their natural applicability as one of the enabling technologies in moving towards Industry 4.0 SCs are investigated in detail. It is found that the proposed approach can help decision-makers inside manufacturing firms to make prompt decisions with less human interactions. The merit of the developed MAS is demonstrated through a real-world implementation on a medical device manufacturer. Finally, the limitations and advantages of the proposed approach are presented together with some remarks for future work.","author":[{"dropping-particle":"","family":"Ghadimi","given":"Pezhman","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Chao","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lim","given":"Ming K.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Heavey","given":"Cathal","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Computers and Industrial Engineering","id":"ITEM-1","issue":"April 2018","issued":{"date-parts":[["2018"]]},"page":"588-600","publisher":"Elsevier","title":"Intelligent sustainable supplier selection using multi-agent technology: Theory and application for Industry 4.0 supply chains","type":"article-journal","volume":"127"}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Ghadimi et al., 2018).

6.4 Risk management

Technology investment has become important in strengthening industries ‘competitiveness ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"a28bfut54qd","properties":{"formattedCitation":"(Nasiri et al., 2020)","plainCitation":"(Nasiri et al., 2020)","noteIndex":0},"citationItems":[{"id":1222,"uris":["http://zotero.org/users/local/VzJHFBGK/items/BUVX7M2X"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/BUVX7M2X"],"itemData":{"id":1222,"type":"article-journal","abstract":"This study investigates the approach required to achieve competitive advantages in the digital supply chain. Moreover, the study examines how digital transformation of companies can fuel smart technologies, leading to improved relationship performance. The results of the survey given to 280 Finnish small and medium-sized enterprises (SMEs) show that digital transformation of the companies alone cannot enhance relationship performance, and that it needs to be coupled with smart technologies to achieve this goal. This means that smart technologies

fully mediate the relationship between digital transformation and relationship performance.","container-title":"Technovation","DOI":"10.1016/j.technovation.2020.102121","ISSN":"01664972","journalAbbreviation":"Technovation","language":"en","page":"102121","source":"DOI.org (Crossref)","title":"Managing the digital supply chain: The role of smart technologies","title-short":"Managing the digital supply chain","URL":"https://linkinghub.elsevier.com/retrieve/pii/S0166497220300110","author":[{"family":"Nasiri","given":"Mina"},{"family":"Ukko","given":"Juhani"},{"family":"Saunila","given":"Minna"},{"family":"Rantala","given":"Tero"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-parts":[["2020",3]]}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Nasiri et al., 2020). However, the factors making these technologies so significant to SCs make them vulnerable. Furthermore, the entire industrial process is currently more open and interconnected, thanks to the enabling technologies ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"a6m8ri0lj0","properties":{"formattedCitation":"(Garay-Rondero et al., 2019)","plainCitation":"(Garay-Rondero et al., 2019)","noteIndex":0},"citationItems":[{"id":1249,"uris":["http://zotero.org/users/local/VzJHFBGK/items/ND2Q38QN"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/ND2Q38QN"],"itemData":{"id":1249,"type":"article-journal","abstract":"Purpose – The purpose of this paper is to present a conceptual model that defines the essential components shaping the new Digital Supply Chains (DSCs) through the implementation and acceleration of Industry 4.0. Design/methodology/approach – The scope of the present work exposes a conceptual approach and review of the key literature from 1989 to 2019, concerning the evolution and transformation of the actors and constructs in logistics and Supply Chain Management (SCM) by means of examining different conceptual models and a state-of-the-art review of Industry 4.0's concepts and elements, with a focus on digitization in supply chain (SC) processes. A detailed study of the constructs and components of SCM, as defined by their authors, resulted in the development of a referential and systematic model that fuses the inherent concepts and roles of SCM, with the new technological trends directed toward digitization, automation, and the increasing use of information and communication technologies across logistics global value chains.","container-title":"Journal of Manufacturing Technology Management","DOI":"10.1108/JMTM-08-2018-0280","ISSN":"1741-038X","issue":"ahead-of-print","journalAbbreviation":"JMTM","language":"en","source":"DOI.org (Crossref)","title":"Digital supply chain model in Industry 4.0","URL":"https://www.emerald.com/insight/content/doi/10.1108/JMTM-08-2018-0280/full/html","volume":"ahead-of-print","author":[{"family":"Garay-Rondero","given":"Claudia Lizette"},{"family":"Martinez-Flores","given":"Jose Luis"},{"family":"Smith","given":"Neale R."},

1{"family":"Caballero Morales","given":"Santiago Omar"},{"family":"Aldrette-
2Malacara","given":"Alejandra"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-
3parts":[["2019",12,12]]}}],"schema":"https://github.com/citation-style-language/schema/raw/
4master/csl-citation.json"}(Garay-Rondero et al., 2019). This means that information
5slowdowns are reduced to close-real-time levels and instances of miscommunication or even
6missing communications are eliminated. With this openness, the system's confidentiality will
7be threatened ADDIN ZOTERO_ITEM CSL_CITATION
8{"citationID":"2ekqBPQh","properties":{"formattedCitation":"(Chhetri et al.,
92017)","plainCitation":"(Chhetri et al.,
102017)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/yvyzAaYw","uris":["http://
11www.mendeley.com/documents/?uuid=2eb812a4-b502-46d3-9019-6094dd19fbc7"],"uri":
12["http://www.mendeley.com/documents/?uuid=2eb812a4-b502-46d3-9019-
136094dd19fbc7"],"itemData":{"DOI":"10.1109/
14ICCAD.2017.8203896","ISBN":"9781538630938","ISSN":"10923152","abstract":"© 2017
15IEEE. The next industrial revolution will incorporate various enabling technologies. These
16technologies will make the product lifecycle of the manufacturing system efficient,
17decentralized, and well-connected. However, these technologies have various security
18issues, and when integrated in the product lifecycle of manufacturing systems can pose
19various challenges for maintaining the security requirements such as confidentiality, integrity,
20and availability. In this paper, we will present the various trends and advances in the security
21of the product lifecycle of the manufacturing system while highlighting the roles played by the
22major enabling components of Industry 4.0.","author":[{"dropping-
23particle":"","family":"Chhetri","given":"Sujit Rokka","non-dropping-particle":"","parse-
24names":false,"suffix":""},{"dropping-particle":"","family":"Rashid","given":"Nafiul","non-
25dropping-particle":"","parse-names":false,"suffix":""},{"dropping-
26particle":"","family":"Faezi","given":"Sina","non-dropping-particle":"","parse-
27names":false,"suffix":""},{"dropping-particle":"Al","family":"Faruque","given":"Mohammad
28Abdullah","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"IEEE/
29ACM International Conference on Computer-Aided Design, Digest of Technical Papers,
30ICCAD","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"page":"1039-1046","title":"Security
31trends and advances in manufacturing systems in the era of industry 4.0","type":"article-
32journal","volume":"2017-Novem"}}],"schema":"https://github.com/citation-style-language/
33schema/raw/master/csl-citation.json"}(Chhetri et al., 2017). In other words, interconnecting
34the different devices and exchanging with external parties of the organisation like customers
35implies that the firm’s system is opening into a big number and type of attacks, see REF
36_Ref16329645 \h Table 4. Besides, international networks depend intensely on technology

innovations not only for managing SC complexity but also to assure its effectiveness ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"3cxR9aKd","properties":{"formattedCitation":"(Hahn, 2019)","plainCitation":"(Hahn, 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/Tj4YuVEd","uris":["http://www.mendeley.com/documents/?uuid=832915c9-abd4-4a1a-9587-d2102fc0b58b"],"uri":["http://www.mendeley.com/documents/?uuid=832915c9-abd4-4a1a-9587-d2102fc0b58b"],"itemData":{"DOI":"10.1080/00207543.2019.1641642","ISSN":"0020-7543","author":[{"dropping-particle":"","family":"Hahn","given":"Gerd J.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Research","id":"ITEM-1","issue":"0","issued":{"date-parts":[["2019"]]},"page":"1-11","publisher":"Taylor & Francis","title":"Industry 4.0: a supply chain innovation perspective","type":"article-journal","volume":"0"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Hahn, 2019). This reliability will increase their vulnerability to cyber-attacks ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"l8pdkTHj","properties":{"formattedCitation":"(Smith and Dhillon, 2019)","plainCitation":"(Smith and Dhillon, 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ab4xd6fw","uris":["http://www.mendeley.com/documents/?uuid=f0e76338-b89d-4898-b5dc-2f257696c138"],"uri":["http://www.mendeley.com/documents/?uuid=f0e76338-b89d-4898-b5dc-2f257696c138"],"itemData":{"DOI":"10.1007/978-3-030-03813-7","ISBN":"978-3-030-03812-0","abstract":"Chapter 1. Revisiting Supply Chain Risk.- Chapter 2. Assessing the vulnerability of supply chains: Advances from engineering systems.- Chapter 3. Using Scenario Planning to Supplement Supply Chain Risk Assessments.- Chapter 4. Decision Support Systems and Artificial Intelligence in Supply Chain Risk Management.- Chapter 5. Resilience Assessment in Complex Supply Networks.- Chapter 6. What value for whom in risk management? -- A multi value perspective on risk management in an engineering project supply chain.- Chapter 7. Risk Management of Critical Logistical Infrastructures: Securing the Basis for Effective and Efficient Supply Chains.- Chapter 8. Procedure Model for Supply Chain Digitalization Scenarios for a Data-Driven Supply Chain Risk Management.- Chapter 9. Preparing for the Worst.- Chapter 10. The future of resilient supply chains.- Chapter 11. Can Buyer Consortiums Improve Supplier Compliance?- Chapter 12. Leadership in Risky Supply Chains.- Chapter 13. Malicious Supply Chain Risk: A Literature Review and Future Directions.- Chapter 14. A behavioural view of supply chain risk management.- Chapter 15. Resilience and sustainability in Supply Chains.- Chapter 16. Sustainability Risk Management in Supply Chain.- Chapter 17. The Relationship between Firm Resilience to Supply Chain Disruptions and Firm Innovation.- Chapter 18. Supply Chain Virtualization: Facilitating Agent Trust Utilizing Blockchain Technology.- Chapter 19. Differentiating between supply and supplier risk for better supply

chain risk management.- Chapter 20. Categorizing Supply Chain Risks: Review, Integrated Typology and Future Research.- Chapter 21. The Impact of Supply Chain Disruptions on Organizational Performance: A Literature Review.- Chapter 22. The Management of Disruption Supply Risks at Vestas Wind Systems.- Chapter 23. Foreign Exchange Risk Mitigation Strategies in Global Sourcing: The case of Vortice SPA.- Chapter 24. The paradox of risk management: a supply management practice perspective.- Chapter 25. Risk in complex supply chains, networks and systems.- Chapter 26.Surfing the Tides of Political Tumult: Supply Chain Risk Management in an Age of Governmental Turbulence.","author":[{"dropping-particle":"","family":"Smith","given":"Kane J","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Dhillon","given":"Gurpreet","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issued":{"date-parts":[["2019"]]},"number-of-pages":"299-311","publisher":"Springer International Publishing","title":"Revisiting Supply Chain Risk","type":"book","volume":"7"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Smith and Dhillon, 2019).

When companies embrace digital SC frameworks to coordinate and transact with their accomplices, they confront critical risks ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"Ysf5sNhP","properties":{"formattedCitation":"(Xue et al., 2013)","plainCitation":"(Xue et al., 2013)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/BTEpH6N5","uris":["http://www.mendeley.com/documents/?uuid=6ac57ed0-1ab8-4562-a323-6b7aeecac501"],"uri":["http://www.mendeley.com/documents/?uuid=6ac57ed0-1ab8-4562-a323-6b7aeecac501"],"itemData":{"DOI":"10.2753/mis0742-1222300110","ISSN":"0742-1222","abstract":"Firms face significant risk when they adopt digital supply chain systems to transact and coordinate with their partners. Drawn upon modular systems theory, this study proposes that system modularity mitigates the risk of adopting digital supply chain systems and therefore motivates firms to digitize more of their supply chain operations. The study theorizes how the risk-mitigating effect of system modularity can be enhanced by the allocation of decision rights to the IT (information technology) unit. The main logic is that IT managers with more domain IT knowledge can better utilize their knowledge in decision making to achieve effective system modularity. We tested these theoretical propositions using a survey study of Chinese companies and found empirical support. We also found that the allocation of decision rights to the IT unit does not directly mitigate the perceived risk of digital supply chain systems, which highlights the role of decision allocation to the IT unit as a key moderator in risk mitigation. The study generates theoretical and practical

implications on how IT governance and system modularity may jointly mitigate risk and foster supply chain digitization.","author":[{"dropping-particle":"","family":"Xue","given":"Ling","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zhang","given":"Cheng","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ling","given":"Hong","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zhao","given":"Xia","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Management Information Systems","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2013"]]},"page":"325-352","title":"Risk Mitigation in Supply Chain Digitization: System Modularity and Information Technology Governance","type":"article-journal","volume":"30"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Xue et al., 2013). Moreover, the digital transformation in the fourth industrial revolution age creates a kind of complexity and uncertainty, threatening SCs ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"XSlvWwNb","properties":{"formattedCitation":"(Faizal and Palaniappan, 2014)","plainCitation":"(Faizal and Palaniappan, 2014)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/u1nJRUVA","uris":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"uri":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"itemData":{"abstract":"Supply chains have expanded rapidly over the decades, with the aim to increase productivity, lower costs and fulfil demands in emerging markets. The increasing complexity in a supply chain hinders visibility and consequently reduces one’s control over the process. Cases of disruption such as the ones faced by Ericsson have shown that a risk event occurring at one point of the supply chain can greatly affect other members, when the disruption is not properly controlled. Complexity and disintegration are emerging as major challenges in supply-chain risk management. It has become more difficult to identify risks as supply-chain operations have fallen into the hands of outside service providers, and are therefore less visible. The risks, their identification and impact depend on the position of the companies in the chain, and on the level of analysis they can carry out. . Supply chain management thus faces a pressing need to maintain the expected yields of the system in risk situations. This work provides a review of definitions and classifications of types of risk; a holistic view of risk assessment and management is taken here. This project aims to analyse how supply chain risks could be effectively managed. This is done firstly by positioning the

research agenda in Supply chain Risk Management (SCRM).Then, methods for effective management of supply chain risk are identified and analysed","author":[{"dropping-particle":"","family":"Faizal","given":"K","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Palaniappan","given":"PL. K.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Global Journal of Researches in Engineering","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2014"]]},"page":"19-30","title":"Risk Assessment and Management in Supply Chain","type":"article-journal","volume":"14"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Faizal and Palaniappan, 2014). Hence, through the adoption and acceptance of multiple technologies in the SC, particularly, new risks impact the companies ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"fI7yesKW","properties":{"formattedCitation":"(Kumar et al., 2019a)","plainCitation":"(Kumar et al., 2019a)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ysQpknAU","uris":["http://www.mendeley.com/documents/?uuid=73c0d8eb-9a08-4d12-955e-67b942b35b65"],"uri":["http://www.mendeley.com/documents/?uuid=73c0d8eb-9a08-4d12-955e-67b942b35b65"],"itemData":{"DOI":"10.1007/978-981-13-8165-2","ISBN":"978-981-13-8164-5","author":[{"dropping-particle":"","family":"Kumar","given":"Kaushik","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zindani","given":"Divya","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Davim","given":"J. Paulo","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issued":{"date-parts":[["2019"]]},"page":"35-42","title":"Industry 4.0","type":"article-journal","volume":"0"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Kumar et al., 2019). These risks include malware, cyberattack, spyware, and data loss that can eventually have a significant impact on the different production procedures ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"65bgswrF","properties":{"formattedCitation":"(Kumar et al., 2019a)","plainCitation":"(Kumar et al., 2019a)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ysQpknAU","uris":["http://www.mendeley.com/documents/?uuid=73c0d8eb-9a08-4d12-955e-67b942b35b65"],"uri":["http://www.mendeley.com/documents/?uuid=73c0d8eb-9a08-4d12-955e-67b942b35b65"],"itemData":{"DOI":"10.1007/978-981-13-8165-2","ISBN":"978-981-13-8164-5","author":[{"dropping-

particle":"","family":"Kumar","given":"Kaushik","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zindani","given":"Divya","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Davim","given":"J. Paulo","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issued":{"date-parts":[["2019"]]},"page":"35-42","title":"Industry 4.0","type":"article-journal","volume":"0"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Kumar et al., 2019a). To sum up, companies are facing the challenge of implementing new supply chain technologies. However, securing adequately digital SCs is the real challenge as hackers aim to attack manufacturing activities ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"rS44GUoI","properties":{"formattedCitation":"(Kumar et al., 2019a)","plainCitation":"(Kumar et al., 2019a)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ysQpknAU","uris":["http://www.mendeley.com/documents/?uuid=73c0d8eb-9a08-4d12-955e-67b942b35b65"],"uri":["http://www.mendeley.com/documents/?uuid=73c0d8eb-9a08-4d12-955e-67b942b35b65"],"itemData":{"DOI":"10.1007/978-981-13-8165-2","ISBN":"978-981-13-8164-5","author":[{"dropping-particle":"","family":"Kumar","given":"Kaushik","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zindani","given":"Divya","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Davim","given":"J. Paulo","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issued":{"date-parts":[["2019"]]},"page":"35-42","title":"Industry 4.0","type":"article-journal","volume":"0"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Kumar et al., 2019). The consequences of such cyberattacks are economic losses exceeding US $1 trillion in annual revenue losses for the entire industry ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"uJOQcMaK","properties":{"formattedCitation":"(Smith and Dhillon, 2019)","plainCitation":"(Smith and Dhillon, 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ab4xd6fw","uris":["http://www.mendeley.com/documents/?uuid=f0e76338-b89d-4898-b5dc-2f257696c138"],"uri":["http://www.mendeley.com/documents/?uuid=f0e76338-b89d-4898-b5dc-2f257696c138"],"itemData":{"DOI":"10.1007/978-3-030-03813-7","ISBN":"978-3-030-03812-0","abstract":"Chapter 1. Revisiting Supply Chain Risk.- Chapter 2. Assessing the vulnerability of supply chains: Advances from engineering systems.- Chapter 3. Using Scenario Planning to

Supplement Supply Chain Risk Assessments.- Chapter 4. Decision Support Systems and Artificial Intelligence in Supply Chain Risk Management.- Chapter 5. Resilience Assessment in Complex Supply Networks.- Chapter 6. What value for whom in risk management? -- A multi value perspective on risk management in an engineering project supply chain.- Chapter 7. Risk Management of Critical Logistical Infrastructures: Securing the Basis for Effective and Efficient Supply Chains.- Chapter 8. Procedure Model for Supply Chain Digitalization Scenarios for a Data-Driven Supply Chain Risk Management.- Chapter 9. Preparing for the Worst.- Chapter 10. The future of resilient supply chains.- Chapter 11. Can Buyer Consortiums Improve Supplier Compliance?- Chapter 12. Leadership in Risky Supply Chains.- Chapter 13. Malicious Supply Chain Risk: A Literature Review and Future Directions.- Chapter 14. A behavioural view of supply chain risk management.- Chapter 15. Resilience and sustainability in Supply Chains.- Chapter 16. Sustainability Risk Management in Supply Chain.- Chapter 17. The Relationship between Firm Resilience to Supply Chain Disruptions and Firm Innovation.- Chapter 18. Supply Chain Virtualization: Facilitating Agent Trust Utilizing Blockchain Technology.- Chapter 19. Differentiating between supply and supplier risk for better supply chain risk management.- Chapter 20. Categorizing Supply Chain Risks: Review, Integrated Typology and Future Research.- Chapter 21. The Impact of Supply Chain Disruptions on Organizational Performance: A Literature Review.- Chapter 22. The Management of Disruption Supply Risks at Vestas Wind Systems.- Chapter 23. Foreign Exchange Risk Mitigation Strategies in Global Sourcing: The case of Vortice SPA.- Chapter 24. The paradox of risk management: a supply management practice perspective.- Chapter 25. Risk in complex supply chains, networks and systems.- Chapter 26.Surfing the Tides of Political Tumult: Supply Chain Risk Management in an Age of Governmental Turbulence.","author":[{"dropping-particle":"","family":"Smith","given":"Kane J","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Dhillon","given":"Gurpreet","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issued":{"date-parts":[["2019"]]},"number-of-pages":"299-311","publisher":"Springer International Publishing","title":"Revisiting Supply Chain Risk","type":"book","volume":"7"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Smith and Dhillon, 2019).

Advanced manufacturing techniques, integrated cyber-space systems, complex components and therefore, the various services of outsourcing are the main sources of risks. So, appropriate identification of different risks helps in risk management ADDIN

1ZOTERO_ITEM CSL_CITATION {"citationID":"0BsWOtAF","properties":
2{"formattedCitation":"(Kumar et al., 2019b)","plainCitation":"(Kumar et al.,
32019b)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/LDqOTxWs","uris":
4["http://www.mendeley.com/documents/?uuid=a707df61-acb7-4f1e-bc78-
5fdab643cef78"],"uri":["http://www.mendeley.com/documents/?uuid=a707df61-acb7-4f1e-
6bc78-fdab643cef78"],"itemData":{"DOI":"10.1007/978-981-13-8165-2","ISSN":"978-981-13-
78164-5","author":[{"dropping-particle":"","family":"Kumar","given":"Kaushik","non-dropping-
8particle":"","parse-names":false,"suffix":""},{"dropping-
9particle":"","family":"Zindani","given":"Divya","non-dropping-particle":"","parse-
10names":false,"suffix":""},{"dropping-particle":"","family":"Davim","given":"J Paulo","non-
11dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issued":{"date-parts":
12[["2019"]]},"page":"35-42","title":"Industry
134.0","type":"chapter","volume":"0"}}],"schema":"https://github.com/citation-style-language/
14schema/raw/master/csl-citation.json"}(Kumar et al., 2019). According to ADDIN 15ZOTERO_ITEM CSL_CITATION {"citationID":"s8RtEftU","properties":
16{"formattedCitation":"(Colicchia, Creazza and Menachof, 2019)","plainCitation":"(Colicchia,
17Creazza and Menachof,
182019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/FRJfBvoX","uris":["http://
19www.mendeley.com/documents/?uuid=975a48aa-380b-4362-ad00-dae6b73d3404"],"uri":
20["http://www.mendeley.com/documents/?uuid=975a48aa-380b-4362-ad00-
21dae6b73d3404"],"itemData":{"DOI":"10.1108/SCM-09-2017-
220289","ISSN":"13598546","abstract":"Purpose – The purpose of this paper is to explore how
23companies approach the management of cyber and information risks in their supply chain,
24what initiatives they adopt to this aim, and to what extent along the supply chain. In fact, the
25increasing level of connectivity is transforming supply chains, and it creates new
26opportunities but also new risks in the cyber space. Hence, cyber supply chain risk
27management (CSCRM) is emerging as a new management construct. The ultimate aim is to
28help organizations in understanding and improving the CSCRM process and cyber resilience
29in their supply chains. Design/methodology/approach – This research relied on a qualitative
30approach based on a comparative case study analysis involving five large multinational
31companies with headquarters, or branches, in the UK. Findings – Results highlight the
32importance for CSCRM to shift the viewpoint from the traditional focus on companies' internal
33information technology (IT) infrastructure, able to "firewall themselves" only, to the whole
34supply chain with a cross-functional approach; initiatives for CSCRM are mainly adopted to
35"respond" and "recover" without a well-rounded approach to supply chain resilience for a
36long-term capacity to adapt to changes according to an evolutionary approach. Initiatives are
37adopted at a firm/dyadic level, and a network perspective is missing. Research

limitations/implications – This paper extends the current theory on cyber and information risks in supply chains, as a combination of supply chain risk management and resilience, and information risk management. It provides an analysis and classification of cyber and information risks, sources of risks and initiatives to managing them according to a supply chain perspective, along with an investigation of their adoption across the supply chain. It also studies how the concept of resilience has been deployed in the CSCRM process by companies. By laying the first empirical foundations of the subject, this study stimulates further research on the challenges and drivers of initiatives and coordination mechanisms for CSCRM at a supply chain network level. Practical implications – Results invite companies to break the “silos” of their activities in CSCRM, embracing the whole supply chain network for better resilience. The adoption of IT security initiatives should be combined with organisational ones and extended beyond the dyad. Where applicable, initiatives should be bi-directional to involve supply…","author":[{"dropping-particle":"","family":"Colicchia","given":"Claudia","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Creazza","given":"Alessandro","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Menachof","given":"David A.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2019"]]},"page":"215-240","title":"Managing cyber and information risks in supply chains: insights from an exploratory analysis","type":"article-journal","volume":"24"}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Colicchia, Creazza and Menachof, 2019), the major information risks in a SC are considered the followings:

- *Risk to information confidentiality*: concerns for the potential loss of control over sensitive information/data throughout the SC. In the digital era, confidentiality loss can be costly for an organization as there is significant information flows that need to be protected;
- *Risk to information privacy*: concerns the possible misuse of information/data in other context than the main purpose set by the information proprietor;
- *Risk to information integrity:* concerns the possible corruption and damage of data/information stored in the SC system. Because of the digitalization of SCs, cyber-attacks can easily affect the integrity of industrial systems.

Consequently, to avoid these risks, the three fundamental security requirements for the next generation of smart SCs are as follows:

- *Confidentiality:* It involves maintaining the privacy of the information flow throughout the horizontal and the vertical value chains of the manufacturing system;
- Availability: Various forms of cyber and physical attacks can cause the manufacturing system to be out of service. In a well-connected I4.0, an attack on the availability may be mitigated due to the distributed architecture;
- *Integrity*: ensures proper modification or destruction.

To build resilient supply chains, there are diverse capabilities that need to be in place ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"auva11a967","properties":{"formattedCitation":"(Dubey et al., 2020)","plainCitation":"(Dubey et al., 2020)","noteIndex":0},"citationItems":[{"id":1217,"uris":["http://zotero.org/users/local/VzJHFBGK/items/TH597ZWV"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/TH597ZWV"],"itemData":{"id":1217,"type":"article-journal","container-title":"International Journal of Production Research","DOI":"10.1080/00207543.2020.1722860","ISSN":"0020-7543, 1366-588X","issue":"11","journalAbbreviation":"International Journal of Production Research","language":"en","page":"3381-3398","source":"DOI.org (Crossref)","title":"Blockchain technology for enhancing swift-trust, collaboration and resilience within a humanitarian supply chain setting","URL":"https://www.tandfonline.com/doi/full/10.1080/00207543.2020.1722860","volume":"58","author":[{"family":"Dubey","given":"Rameshwar"},{"family":"Gunasekaran","given":"Angappa"},{"family":"Bryde","given":"David J."},{"family":"Dwivedi","given":"Yogesh K."},{"family":"Papadopoulos","given":"Thanos"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":{"date-parts":[["2020",6,2]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Dubey et al., 2020). Stakeholders should focus on identifying, measuring and analyzing risks to reduce negative impacts ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"auguc3ks95","properties":{"formattedCitation":"(Diaz et al., 2020)","plainCitation":"(Diaz et al., 2020)","noteIndex":0},"citationItems":[{"id":1225,"uris":["http://zotero.org/users/local/VzJHFBGK/items/94JVP9MY"],"uri":["http://zotero.org/users/local/VzJHFBGK/items/94JVP9MY"],"itemData":{"id":1225,"type":"article-journal","container-title":"Procedia Manufacturing","DOI":"10.1016/j.promfg.2020.02.067","ISSN":"23519789","journalAbbreviation":"Procedia Manufacturing","language":"en","page":"173-180","source":"DOI.org (Crossref)","title":"Shipbuilding Supply Chain Framework and Digital Transformation: A Project Portfolios Risk Evaluation","title-short":"Shipbuilding Supply Chain Framework and Digital Transformation","URL":"https://linkinghub.elsevier.com/retrieve/pii/S2351978920306314","volume":"42","author":[{"family":"Diaz","given":"Rafael"},

1{"family":"Smith","given":"Katherine"},{"family":"Landaeta","given":"Rafael"},
2{"family":"Padovano","given":"Antonio"}],"accessed":{"date-parts":[["2020",7,22]]},"issued":
3{"date-parts":[["2020"]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/
4master/csl-citation.json"}(Diaz et al., 2020). Risk control and management in a digital SC will
5focus specifically on addressing cybersecurity concerning third parties and providing quick
6organisational reactions to unplanned incidents. Furthermore, the security systems for
7SCM4.0 need to detect occurrences of security events, to protect critical structures, implement
8the necessary safeguarding tools, respond to threats in real-time and have the possibility to
9recover every attack, if it happens ADDIN ZOTERO_ITEM CSL_CITATION
10{"citationID":"aXGzjLeW","properties":{"formattedCitation":"(Chhetri et al.,
112017)","plainCitation":"(Chhetri et al.,
122017)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/yvyzAaYw","uris":["http://
13www.mendeley.com/documents/?uuid=2eb812a4-b502-46d3-9019-6094dd19fbc7"],"uri":
14["http://www.mendeley.com/documents/?uuid=2eb812a4-b502-46d3-9019-
156094dd19fbc7"],"itemData":{"DOI":"10.1109/
16ICCAD.2017.8203896","ISBN":"9781538630938","ISSN":"10923152","abstract":"© 2017
17IEEE. The next industrial revolution will incorporate various enabling technologies. These
18technologies will make the product lifecycle of the manufacturing system efficient,
19decentralized, and well-connected. However, these technologies have various security
20issues, and when integrated in the product lifecycle of manufacturing systems can pose
21various challenges for maintaining the security requirements such as confidentiality, integrity,
22and availability. In this paper, we will present the various trends and advances in the security
23of the product lifecycle of the manufacturing system while highlighting the roles played by the
24major enabling components of Industry 4.0.","author":[{"dropping-
25particle":"","family":"Chhetri","given":"Sujit Rokka","non-dropping-particle":"","parse-
26names":false,"suffix":""},{"dropping-particle":"","family":"Rashid","given":"Nafiul","non-
27dropping-particle":"","parse-names":false,"suffix":""},{"dropping-
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30Abdullah","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"IEEE/
31ACM International Conference on Computer-Aided Design, Digest of Technical Papers,
32ICCAD","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"page":"1039-1046","title":"Security
33trends and advances in manufacturing systems in the era of industry 4.0","type":"article-
34journal","volume":"2017-Novem"}}],"schema":"https://github.com/citation-style-language/
35schema/raw/master/csl-citation.json"}(Chhetri et al., 2017). With the new technologies, using

1a risk monitor system based on BD and warning indicators will help companies to stay one 2step ahead of their competitors if they have been attacked.

1Table 4. SCM 4.0 risks

Risks	Type of risk	References	Solution	References
Macroeconomic fluctuation SC overall coordination Operating status of a single enterprise	Financial risks	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"5pA86J18","properties":{"formattedCitation":"(Faizal and Palaniappan, 2014)","plainCitation":"(Faizal and Palaniappan, 2014)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/u1nJRUVA","uris":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"uri":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"itemData":{"abstract":"Supply chains have expanded rapidly over the decades, with the aim to increase productivity, lower costs and fulfil demands in emerging markets. The increasing complexity in a supply	Perfect the relevant laws and regulations, Standardize the market behaviour Establish a risk control system Giving play to the role of supervision of logistics information. Introduce the insurance institutions	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"Oo004YaB","properties":{"formattedCitation":"(Yang et al., 2019)","plainCitation":"(Yang et al., 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/jn4CBhGT","uris":["http://www.mendeley.com/documents/?uuid=c38dad35-b110-4176-8e9d-f8789964da9a"],"uri":["http://www.mendeley.com/documents/?uuid=c38dad35-b110-4176-8e9d-f8789964da9a"],"itemData":{"DOI":"10.1016/j.cogsys.2019.02.001","ISSN":"13890417","abstract":"The supply chain financial risk management model is established under the Internet financial model, so as to

	chain hinders visibility and consequently reduces one’s control over the process. Cases of disruption such as the ones faced by Ericsson have shown that a risk event occurring at one point of the supply chain can greatly affect other members, when the disruption is not properly controlled. Complexity and disintegration are emerging as major challenges in supply-chain risk management. It has become more difficult to identify risks as supply-chain operations have fallen into the hands of outside service providers, and are therefore less visible. The risks, their identification and impact depend on the position of the companies in the chain, and on the level of analysis they can carry out. . Supply chain	improve the supply chain's ability and resist risks, a financial risk management model of Internet supply chain is proposed based on data science. Firstly, the forms and countermeasures of financial risk in Internet supply chain is analyzed. The data science analysis method is used to analyze the risk management model, and the supply chain financial risk management model is constructed based on the multivariate piecewise regression analysis and the financing decision effectiveness game. The relationship between supply chain financial risk management and enterprise performance is studied under the Internet finance model, the validity of the financing

	management thus faces a pressing need to maintain the expected yields of the system in risk situations. This work provides a review of definitions and classifications of types of risk; a holistic view of risk assessment and management is taken here. This project aims to analyse how supply chain risks could be effectively managed. This is done firstly by positioning the research agenda in Supply chain Risk Management (SCRM).Then, methods for effective management of supply chain risk are identified and analysed","author":[{"dropping-particle":"","family":"Faizal","given":"K","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Palaniappan","given":"PL. K.","non-dropping-particle":"","parse-	decision of Internet supply chain is analyzed, and it constructs the decision model of Internet supply chain by descriptive statistical analysis method. The fuzzy decision method is used to analyze the risk assessment of Internet supply chain, and the Simunic model is used to analyze the correlation model of risk management in Internet supply chain. In order to improve the risk management ability of Internet supply chain, the statistical analysis and comprehensive decision of risk control are carried out by using piecewise sample regression analysis. The results of empirical data analysis show that the model has good piecewise fit for financial risk management and management of supply chain under Internet

		names":false,"suffix":""}],"container-title":"Global Journal of Researches in Engineering","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2014"]]},"page":"19-30","title":"Risk Assessment and Management in Supply Chain","type":"article-journal","volume":"14"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Faizal and Palaniappan, 2014)	financial model, and the accuracy of data evaluation is high. The model is robust for financial risk management and performance evaluation of supply chain.","author":[{"dropping-particle":"","family":"Yang","given":"Qifeng","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Yingying","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ren","given":"Yidong","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Cognitive Systems Research","id":"ITEM-1","issued":{"date-parts":[["2019"]]},"page":"50-55","publisher":"Elsevi

				er B.V.","title":"Research on financial risk management model of internet supply chain based on data science","type":"article-journal","volume":"56"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Yang et al., 2019)
Inbound product quality Product arrival variability(delays) Loss of suppliers	Supply risks	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"Shkit0Ru","properties":{"formattedCitation":"(Faizal and Palaniappan, 2014; Yang et al., 2019)","plainCitation":"(Faizal and Palaniappan, 2014; Yang et al., 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/u1nJRUVA","uris":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"uri":	Establish uniform standards in cooperation with the principal players/ industry associations of the SC	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"FTP5L2vi","properties":{"formattedCitation":"(Schr\\uc0\\u246{}der et al., 2014)","plainCitation":"(Schröder et al., 2014)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ffpPmdRV","uris":["http://www.mendeley.com/documents/?uuid=63a70edd-dc74-4491-9273-3d1b54bc1755"],"uri":["http://

	["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"itemData":{"abstract":"Supply chains have expanded rapidly over the decades, with the aim to increase productivity, lower costs and fulfil demands in emerging markets. The increasing complexity in a supply chain hinders visibility and consequently reduces one’s control over the process. Cases of disruption such as the ones faced by Ericsson have shown that a risk event occurring at one point of the supply chain can greatly affect other members, when the disruption is not properly controlled. Complexity and disintegration are emerging as major challenges in supply-chain risk management. It has become more	www.mendeley.com/documents/?uuid=63a70edd-dc74-4491-9273-3d1b54bc1755"],"itemData":{"ISBN":"9789848187102","abstract":"Industry 4.0, also mentioned as the fourth industrial revolution is characterized by a new method of controlling the production processes. Through the employment of new technical approaches, like e.g. cloud computing or cyber physical systems, the supply chain becomes more flexible and more transparent. However, supply chain management will be increasingly faced with new challenges. Resulting from modified framework conditions in Industry 4.0 also new types of risks may occur. Therefore, the paper aims at identifying the

	difficult to identify risks as supply-chain operations have fallen into the hands of outside service providers, and are therefore less visible. The risks, their identification and impact depend on the position of the companies in the chain, and on the level of analysis they can carry out. . Supply chain management thus faces a pressing need to maintain the expected yields of the system in risk situations. This work provides a review of definitions and classifications of types of risk; a holistic view of risk assessment and management is taken here. This project aims to analyse how supply chain risks could be effectively managed. This is done firstly by positioning the research agenda in Supply chain Risk Management (SCRM).Then, methods	impact of Industry 4.0 on supply chain risk management. Possible risks that might occur will be identified and classified. Changes in the content and running of the supply chain risk management process will be analysed and first risk mitigation measures for professional practice will be given.","author":[{"dropping-particle":"","family":"Schröder","given":"Meike","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Indorf","given":"Marius","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kersten","given":"Wolfgang","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issue":"October","is

		for effective management of supply chain risk are identified and analysed","author":[{"dropping-particle":"","family":"Faizal","given":"K","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Palaniappan","given":"PL. K.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Global Journal of Researches in Engineering","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2014"]]},"page":"19-30","title":"Risk Assessment and Management in Supply Chain","type":"article-journal","volume":"14"}},{"id":"fJ2LYHh2/jn4CBhGT","uris":["http://www.mendeley.com/documents/?uuid=c38dad35-b110-4176-8e9d-f8789964da9a"],"uri":	sued":{"date-parts":[["2014"]]},"page":"15-18","title":"Industry 4.0 and Its Impact on Supply Chain Risk Management","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Schröder et al., 2014)

	["http://www.mendeley.com/documents/?uuid=c38dad35-b110-4176-8e9d-f8789964da9a"],"itemData":{"DOI":"10.1016/j.cogsys.2019.02.001","ISSN":"13890417","abstract":"The supply chain financial risk management model is established under the Internet financial model, so as to improve the supply chain's ability and resist risks, a financial risk management model of Internet supply chain is proposed based on data science. Firstly, the forms and countermeasures of financial risk in Internet supply chain is analyzed. The data science analysis method is used to analyze the risk management model, and the supply chain financial risk management model is constructed based on

	the multivariate piecewise regression analysis and the financing decision effectiveness game. The relationship between supply chain financial risk management and enterprise performance is studied under the Internet finance model, the validity of the financing decision of Internet supply chain is analyzed, and it constructs the decision model of Internet supply chain by descriptive statistical analysis method. The fuzzy decision method is used to analyze the risk assessment of Internet supply chain, and the Simunic model is used to analyze the correlation model of risk management in Internet supply chain. In order to improve the risk management ability of Internet supply chain, the statistical analysis and comprehensive	

	decision of risk control are carried out by using piecewise sample regression analysis. The results of empirical data analysis show that the model has good piecewise fit for financial risk management and management of supply chain under Internet financial model, and the accuracy of data evaluation is high. The model is robust for financial risk management and performance evaluation of supply chain.","author": [{"dropping-particle":"","family":"Yang","given":"Qifeng","non-dropping-particle":"","parse-names":false,"suffix":""}, {"dropping-particle":"","family":"Wang","given":"Yingying","non-dropping-particle":"","parse-names":false,"suffix":""}, {"dropping-particle":"","family":"Ren	

		","given":"Yidong","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Cognitive Systems Research","id":"ITEM-2","issued":{"date-parts":[["2019"]]},"page":"50-55","publisher":"Elsevier B.V.","title":"Research on financial risk management model of internet supply chain based on data science","type":"article-journal","volume":"56"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Faizal and Palaniappan, 2014; Yang et al., 2019)
Fluctuating clients demands Demand	Demand risks	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"fvON6k5c","properties":{"formattedCitation":"(Faizal and Palaniappan, 2014)","plainCitation":"(Faizal and Palaniappan,

	2014)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/u1nJRUVA","uris":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"uri":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"itemData":{"abstract":"Supply chains have expanded rapidly over the decades, with the aim to increase productivity, lower costs and fulfil demands in emerging markets. The increasing complexity in a supply chain hinders visibility and consequently reduces one’s control over the process. Cases of disruption such as the ones faced by Ericsson have shown that a risk event occurring at one point of the supply chain can greatly affect other	

	members, when the disruption is not properly controlled. Complexity and disintegration are emerging as major challenges in supply-chain risk management. It has become more difficult to identify risks as supply-chain operations have fallen into the hands of outside service providers, and are therefore less visible. The risks, their identification and impact depend on the position of the companies in the chain, and on the level of analysis they can carry out. . Supply chain management thus faces a pressing need to maintain the expected yields of the system in risk situations. This work provides a review of definitions and classifications of types of risk; a holistic view of risk assessment and management is taken	

	here. This project aims to analyse how supply chain risks could be effectively managed. This is done firstly by positioning the research agenda in Supply chain Risk Management (SCRM).Then, methods for effective management of supply chain risk are identified and analysed","author":[{"dropping-particle":"","family":"Faizal","given":"K","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Palaniappan","given":"PL. K.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Global Journal of Researches in Engineering","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2014"]]},"page":"19-30","title":"Risk Assessment and Management in Supply	

		Chain","type":"article-journal","volume":"14"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Faizal and Palaniappan, 2014)
Lack of skilled workers Machine-information security	Operational risks	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"FDcFXsSs","properties":{"formattedCitation":"(Faizal and Palaniappan, 2014)","plainCitation":"(Faizal and Palaniappan, 2014)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/u1nJRUVA","uris":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"uri":["http://www.mendeley.com/documents/?uuid=f62ef462-0e39-453b-a258-0fe664fb888a"],"itemData":{"abstract":"Supply chains have expanded rapidly over the

	decades, with the aim to increase productivity, lower costs and fulfil demands in emerging markets. The increasing complexity in a supply chain hinders visibility and consequently reduces one's control over the process. Cases of disruption such as the ones faced by Ericsson have shown that a risk event occurring at one point of the supply chain can greatly affect other members, when the disruption is not properly controlled. Complexity and disintegration are emerging as major challenges in supply-chain risk management. It has become more difficult to identify risks as supply-chain operations have fallen into the hands of outside service providers, and are therefore less visible. The risks, their identification and	

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		names":false,"suffix":""},{"dropping-particle":"","family":"Palaniappan","given":"PL. K.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Global Journal of Researches in Engineering","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2014"]]},"page":"19-30","title":"Risk Assessment and Management in Supply Chain","type":"article-journal","volume":"14"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Faizal and Palaniappan, 2014)
Natural/man-made disasters.	Environmental risks	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"Jrche40e","properties":{"formattedCitation":"(Faizal and Palaniappan, 2014)","plainCitation":"(Faizal and Palaniappan, 2014)","noteIndex":0},"c

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		journal","volume":"14"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Faizal and Palaniappan, 2014)		
Confidentiality Cyberattack Data theft Exploitation of maintenance access Higher vulnerability to operational accidents Information privacy Intellectual property Lose customer's data Malware and loss of data Network vulnerability scans Risk to information Risk to information integrity Specific investment Spyware The loss of resource control Transaction risk	I4.0 risks	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"sHWbZB7S","properties":{"formattedCitation":"(Colicchia, Creazza and Menachof, 2019; Schr\\uc0\\u246{}der et al., 2014; Xue et al., 2013)","plainCitation":"(Colicchia, Creazza and Menachof, 2019; Schröder et al., 2014; Xue et al., 2013)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/FRJfBvoX","uris":["http://www.mendeley.com/documents/?uuid=975a48aa-380b-4362-ad00-dae6b73d3404"],"uri":["http://www.mendeley.com/documents/?uuid=975a48aa-380b-4362-ad00-	Identify, measure and analyze risks Implement appropriate safeguards to protect critical infrastructures, Detect the occurrence of security events, Respond to threats, Recover after an attack has happened Diversify regarding technological systems	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"ZSBAuVTK","properties":{"formattedCitation":"(Arunachalam et al., 2018; Schr\\uc0\\u246{}der et al., 2014)","plainCitation":"(Arunachalam et al., 2018; Schröder et al., 2014)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ffpPmdRV","uris":["http://www.mendeley.com/documents/?uuid=63a70edd-dc74-4491-9273-3d1b54bc1755"],"uri":["http://www.mendeley.com/documents/?uuid=63a70edd-dc74-4491-9273-3d1b54bc1755"],"itemData":

	dae6b73d3404"],"itemData":{"DOI":"10.1108/SCM-09-2017-0289","ISSN":"13598546","abstract":"Purpose – The purpose of this paper is to explore how companies approach the management of cyber and information risks in their supply chain, what initiatives they adopt to this aim, and to what extent along the supply chain. In fact, the increasing level of connectivity is transforming supply chains, and it creates new opportunities but also new risks in the cyber space. Hence, cyber supply chain risk management (CSCRM) is emerging as a new management construct. The ultimate aim is to help organizations in understanding and improving the CSCRM process and cyber resilience in their supply chains. Design/methodology/approach – This research	{"ISBN":"9789984818702","abstract":"Industry 4.0, also mentioned as the fourth industrial revolution is characterized by a new method of controlling the production processes. Through the employment of new technical approaches, like e.g. cloud computing or cyber physical systems, the supply chain becomes more flexible and more transparent. However, supply chain management will be increasingly faced with new challenges. Resulting from modified framework conditions in Industry 4.0 also new types of risks may occur. Therefore, the paper aims at identifying the impact of Industry 4.0 on supply chain risk management. Possible risks that might occur will be identified and classified. Changes in

	relied on a qualitative approach based on a comparative case study analysis involving five large multinational companies with headquarters, or branches, in the UK. Findings – Results highlight the importance for CSCRM to shift the viewpoint from the traditional focus on companies' internal information technology (IT) infrastructure, able to "firewall themselves" only, to the whole supply chain with a cross-functional approach; initiatives for CSCRM are mainly adopted to "respond" and "recover" without a well-rounded approach to supply chain resilience for a long-term capacity to adapt to changes according to an evolutionary approach. Initiatives are adopted at a firm/dyadic level, and a network perspective is missing. Research		the content and running of the supply chain risk management process will be analysed and first risk mitigation measures for professional practice will be given.","author":[{"dropping-particle":"","family":"Schröder","given":"Meike","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Indorf","given":"Marius","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kersten","given":"Wolfgang","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issue":"October","issued":{"date-parts":[["2014"]]},"page":"15-18","title":"Industry 4.0 and Its Impact on Supply Chain Risk Management","type":"

	limitations/implications – This paper extends the current theory on cyber and information risks in supply chains, as a combination of supply chain risk management and resilience, and information risk management. It provides an analysis and classification of cyber and information risks, sources of risks and initiatives to managing them according to a supply chain perspective, along with an investigation of their adoption across the supply chain. It also studies how the concept of resilience has been deployed in the CSCRM process by companies. By laying the first empirical foundations of the subject, this study stimulates further research on the challenges and drivers of initiatives and	article-journal"}}, {"id":"fJ2LYHh2/uf8LzZ2T","uris":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"uri":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"itemData":{"DOI":"10.1016/j.tre.2017.04.001","ISSN":"13665545","abstract":"In the era of Big Data, many organisations have successfully leveraged Big Data Analytics (BDA) capabilities to improve their performance. However, past literature on BDA have put limited focus on understanding the capabilities required to extract value from big data. In this context, this paper aims to provide a systematic literature review of

	coordination mechanisms for CSCRM at a supply chain network level. Practical implications – Results invite companies to break the “silos” of their activities in CSCRM, embracing the whole supply chain network for better resilience. The adoption of IT security initiatives should be combined with organisational ones and extended beyond the dyad. Where applicable, initiatives should be bi-directional to involve supply…","author":[{"dropping-particle":"","family":"Colicchia","given":"Claudia","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Creazza","given":"Alessandro","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Me	BDA capabilities in supply chain and develop the capabilities maturity model. The paper presents the bibliometric and thematic analysis of research papers from 2008 to 2016. This paper contributes in theorizing BDA capabilities in context of supply chain, and provides future direction of research in this field.","author":[{"dropping-particle":"","family":"Arunachalam","given":"Deepak","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kumar","given":"Niraj","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kawalek","given":"John Paul","non-dropping-particle":"","parse-names":false,"suffix":""

	nachof","given":"David A.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2019"]]},"page":"215-240","title":"Managing cyber and information risks in supply chains: insights from an exploratory analysis","type":"article-journal","volume":"24"}},{"id":"fJ2LYHh2/BTEpH6N5","uris":["http://www.mendeley.com/documents/?uuid=6ac57ed0-1ab8-4562-a323-6b7aeecac501"],"uri":["http://www.mendeley.com/documents/?uuid=6ac57ed0-1ab8-4562-a323-6b7aeecac501"],"itemData":{"DOI":"10.2753/mis0742-1222300110","ISSN":"0	}],"container-title":"Transportation Research Part E: Logistics and Transportation Review","id":"ITEM-2","issued":{"date-parts":[["2018"]]},"page":"416-436","publisher":"Elsevier Ltd","title":"Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice","type":"article-journal","volume":"114"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Arunachalam et al., 2018; Schröder et al., 2014)

	742-1222","abstract":"Firms face significant risk when they adopt digital supply chain systems to transact and coordinate with their partners. Drawn upon modular systems theory, this study proposes that system modularity mitigates the risk of adopting digital supply chain systems and therefore motivates firms to digitize more of their supply chain operations. The study theorizes how the risk-mitigating effect of system modularity can be enhanced by the allocation of decision rights to the IT (information technology) unit. The main logic is that IT managers with more domain IT knowledge can better utilize their knowledge in decision making to achieve effective system modularity. We tested these theoretical	

propositions using a survey study of Chinese companies and found empirical support. We also found that the allocation of decision rights to the IT unit does not directly mitigate the perceived risk of digital supply chain systems, which highlights the role of decision allocation to the IT unit as a key moderator in risk mitigation. The study generates theoretical and practical implications on how IT governance and system modularity may jointly mitigate risk and foster supply chain digitization.","author":[{"dropping-particle":"","family":"Xue","given":"Ling","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zhang","given":"Cheng","non-dropping-particle":"","parse-

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	3","issue":"October","issued":{"date-parts":[["2014"]]},"page":"15-18","title":"Industry 4.0 and Its Impact on Supply Chain Risk Management","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Colicchia, Creazza and Menachof, 2019; Schröder et al., 2014; Xue et al., 2013)	

17. Research gaps, Directions for future research and Implications for practitioners

This paper is the first to review the existing literature on SCM4.0 published during the period between 1994 and 2020 and to develop a roadmap framework for the implementation of SCM4.0. Hence, to encourage research in the field of digital supply chain management, the following gaps in the existing literature, directions for future research and implication for practitioners are established.

7.1 Research gaps and directions for future research

In the present paper, SCM4.0 was analyzed through a literature review. From such an analysis, the following research gaps were identified:

- The field lacks a framework that provides a roadmap for the implementation of SCM 4.0. The existing frameworks do not provide strategic and concrete guidelines to implement a SCM 4.0. It would be helpful for organizations to have a roadmap on how to digitalize their SCs. The roadmap should take into consideration the different needed resources (e.g. financial, human competencies, legal, ethics, environment).
- From the 176 papers identified, no article discussed the SC skills needed in the I4.0 era. With the digitalization of SCs, new jobs will be created. Those jobs will be dedicated to novel competencies. Therefore, this former should be well known in order to be included in the educational system of new graduated generations and to re-orient the labor market.
- There is a lack of articles that deal with SCM4.0 in various industries, e.g. food, fashion, etc. Despite the significant role that the automotive industry commonly plays in the advancement of technology development and its application, no paper studying a real-case implementation of SCM4.0 in this industry was identified;
- From the bibliometric analysis, it was clear that there is a lack of discussion about digital and smart SCs far away from its enablers (novel technologies). In other words, the studies about Digital SCM are not sufficient to well understand all the changes made in the value chain. Moreover, the digitalization of each SC process is not treated in any of the papers;
- A lack of research dealing with SCM4.0's implementation and sustainment challenges was also identified. Despite the importance of sustainability to retain a competitive advantage, none of the selected papers studied the co-existence of sustainability and the smartness in the SC. Additionally, the impact of digitalization on the different dimensions of SC sustainability is not discussed;

- In the 176 papers studied, authors have not explored the effects of the implementation of SCM 4.0 on human beings performance. Humans are the core of any organisation. Hence, it is of paramount importance to implement technologies that help to improve productivity but without having negative side effects on the health and safety of humans. Moreover, studies dealing with the probability of people losing their jobs have not been conducted. In other words, the fact of replacing human competencies by novel technology or the creation of new jobs thanks to digitalization should be explored;
- The change from a traditional system to an interconnected network differs from one firm to another. Hence, no article has dealt with overcoming the difficulties of SC transformation. Every SC is different from others (e.g. an automotive SC is different from a Food SC). Thus, it is important to study the specific difficulties (e.g. financial, material, social) that firms could face when digitalizing their SCs. Furthermore, guidelines or a roadmap could also be proposed to overcome those difficulties;
- No article dealing with risk management in the different processes of SCM4.0 was identified. Organizations work in environments of significant uncertainties, and especially, with the emergence of the novel technologies in the SCs, new risks have born. Thus, it is important to conduct studies dealing with the way in which risks can be faced while implementing a digital supply chain. Furthermore, each SC process should be studied to establish strategies to defend the different process resources from internal and external risks.

A future research agenda for SCM4.0 is presented below in the form of research questions, see Table 5. It underlines potential routes for future SCM4.0 research.

Table 5. Research questions to guide further research

SCM 4.0 implementation

1. What is the efficient strategy to transform a traditional into a digital SC?
2. What are the barriers and the negative effects of implementing SCM4.0?
3. Can the current transformation from a traditional to an interconnected SC ensure a better SC performance for every network organisation?
4. Can a company's location affect the implementation of SC4.0?
5. What constitutes an effective digitalization approach?

SCM 4.0 in industry

1. Is it sufficient to have one roadmap framework for all industries?
2. Can the current implementation framework be adapted to a specific industry?

SCM 4.0 and Human resources

1. What are the SC skills needed in the SCM 4.0 era?
2. Can SCM4.0 have a negative effect on the employees' social lives?
3. What is the human contribution in the SCM4.0 performance of an organisation?

Technologies in SCM 4.0

1. What is the most appropriate technology for each SC process?
2. What may be the main drivers and barriers to implementing a specific technology in the SC?

Risk management in SCM 4.0

1. What are the new potential risks appearing with SC digitalization?
2. How can the SC4.0 be protected against threats and incidents?
3. What are the characteristics of an effective risk management approach for SC4.0?

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2**7.2 Implications for practitioners and managers**

3This paper has four main implications for theory and practice. First, it provides a solid 4background to the subject field of SCM4.0 in the digitalization era. Second, the literature 5review offers unique insights on the theme and outlines motivations, barriers and technologies 6impact. Third, it can be a reference for researchers to have an overview of SCM 4.0's context 7and issues to work on in future studies. Finally, a conceptualized framework for the 8implementation of SCM4.0 is developed, which may be followed up as a roadmap in further 9works. The study contributes to the literature of SCM4.0 by being the first study focusing on 10both SCM4.0 and its technologies.

Practitioners and managers are exposed to significant information regarding new trends, techniques and methods derived from I4.0. For this reason, they may struggle to implement SCM4.0 and may be confused to select the suitable technologies for their SCs. Moreover, they may find difficult to define the impact of each technology in the SC. Our study offers a framework, see Figure 12, to guide practitioners and managers to implement SCM4.0 and make them aware of possible risks they may face. Our framework distinguishes different components that are essential for every SC transformation.

8. Conclusions

This study presents a state-of-the-art literature review on SCM4.0 and proposes a conceptual framework to better understand digital SCM as guidelines for SCM4.0 managers. SCM4.0 refers to the development of SCs, a consequence of the changing innovation scene, and expanding availability between computerised and physical universes.

New access to data, computational capacities, and inventive advancements have fallen and associated with the once direct SC. Presently, real-time data and experiences can be shared over the whole supply system to drive decisions. These changes are going on rapidly. In any case, with change comes opportunity: the capacity of digital SC to assume an indispensable choice-making, modifying numerous supply systems to the particular needs of customers.

The developed framework has various useful components that may encourage scientists and practitioners to use it. It offers a straightforward, easy-to-use graphical representation of SCM4.0. Moreover, it focuses on demonstrating the connection between modules in the field. The framework represents an explanatory instrument and a reference roadmap. Hence, apply the SCM4.0 proposed framework will be deployed in an industrial real-case application such as the digitalization of an automotive SC.

This paper has a number of limitations that offer opportunities for the development of future studies. The suggested understanding framework is designed to support SCM4.0's explanation overall. Consequently, it does not provide a detailed explanation of the third level of the SCM 4.0's framework. Thus, future studies can broaden the framework, concentrating on specific components. In other words, the present framework can be expanded and the significance of the various subcomponents and elements can be studied too.

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Yudi Fernando Ika Sari Wahyuni-TD, R.R.M.C. and Article. (2017), "Benchmarking: An International Journal The impact of big data analytics and data security practices on service supply chain performance", *Benchmarking: An International Journal,* No. June.

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1**Appendix I**: Authors contributions in SCM 4.0

Authors	Year	Key contribution	Technologies
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"YVHfMTA5","properties":{"formattedCitation":"(Chan et al., 2018)","plainCitation":"(Chan et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/5jtSShNJ","uris":["http://www.mendeley.com/documents/?uuid=1102baa6-7646-4baa-935a-fba87179f6d3"],"uri":["http://www.mendeley.com/documents/?uuid=1102baa6-7646-4baa-935a-fba87179f6d3"],"itemData":{"DOI":"10.1016/j.ijpe.2018.09.009","ISSN":"09255273","abstract":"3D Printing (3DP) technology has been receiving increased public attention. Many	2018	Through empirical semi-structured interviews with 3DP businesses in China, it is discovered that many companies have not supplied the 3DP potential as promised.	3DP

companies are seeking ways to develop new means of creating and disseminating 3DP content, in order to capture new business opportunities. However, to date the true business opportunities of 3DP have not been completely uncovered. This research explores the challenges posed in the development and deployment of 3DP and focuses on China, which is still the main manufacturing hub of the world. The main purpose of this research is to uncover the obstacles that resist mass-scale applications of 3DP. By means of empirical semi-structured interviews with 3DP companies in China, it is found that many companies can see the benefits of 3DP, but its potential has not been delivered as promised. One reason is due to the fact that 3DP

has not been integrated well in the supply chain. The other reason concerns potential intellectual property issues that cannot effectively prevent counterfeiting. To tackle the above issues, several areas have been identified that could be improved further. In particular, the legal complications concerning 3D-printed content could be overcome by a licensing platform.","author":[{"dropping-particle":"","family":"Chan","given":"Hing Kai","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Griffin","given":"James","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lim","given":"Jia Jia","non-dropping-particle":"","parse-

names":false,"suffix":""},{"dropping-particle":"","family":"Zeng","given":"Fangli","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Chiu","given":"Anthony S.F.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Economics","id":"ITEM-1","issue":"August","issued":{"date-parts":[["2018"]]},"page":"156-162","title":"The impact of 3D Printing Technology on the supply chain: Manufacturing and legal perspectives","type":"article-journal","volume":"205"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Chan et al., 2018

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"2IOQ7UZy","properties":{"formattedCitation":"(Feldmann and Pumpe, 2017)","plainCitation":"(Feldmann and Pumpe, 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/otnFfkF4","uris":["http://www.mendeley.com/documents/?uuid=a127efe2-a37e-49d4-9f53-765305208001"],"uri":["http://www.mendeley.com/documents/?uuid=a127efe2-a37e-49d4-9f53-765305208001"],"itemData":{"DOI":"10.1016/j.trpro.2017.05.451","ISSN":"23521465","abstract":"Three-dimensional printing (3DP), also known as additive manufacturing, is associated with potentially strong stimuli for revenues and cost savings. Nevertheless, the benefits of 3DP	2017	This paper contributes to the creation of a framework for identifying the contribution of a 3DP investment to boost the value of the business. Because of the existence value-based, SCM concepts cannot provide appropriate responses to The use of 3DP.

compared to conventional manufacturing methods or external sourcing require a holistic analysis for investment decision making. Until now, research has merely assessed case study-related potentials and specific aspects like production costs. Comprehensive information about value drivers in the overall supply chain is weak. Existing value-based supply chain management concepts are only of limited suitability. This paper develops a framework for investment decisions based on Economic Value Added (EVA), providing assessment of value drivers in global supply chains, including an empirical study with eight companies across different industries.","author":[{"dropping-particle":"","family":"Feldmann","given":"Carsten"

,"non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Pumpe","given":"Andreas","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Procedia","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"page":"677-694","publisher":"Elsevier B.V.","title":"A holistic decision framework for 3D printing investments in global supply chains","type":"article-journal","volume":"25"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Feldmann and Pumpe, 2017			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"XmM162Y8","properties":{"formattedCitation":"(Bala,	2012	The paper presents a forecasting model with the inventory replenishment system leading to a decrease in inventory levels and an increase in the level of customer service.	AI

2012)","plainCitation":"(Bala, 2012)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/LODGH6Pe","uris":["http://www.mendeley.com/documents/?uuid=11e42b63-f911-4765-ae10-8620a29c0c10"],"uri":["http://www.mendeley.com/documents/?uuid=11e42b63-f911-4765-ae10-8620a29c0c10"],"itemData":{"DOI":"10.1108/17465661211208794","ISSN":"17465672","abstract":"Purpose – The purpose of this paper is to develop a forecasting model for retailers based on customer segmentation, to improve performance of inventory. Design/methodology/approach – The research makes an attempt to capture the knowledge of segmenting the customers based on

various attributes as an input to the demand forecasting in a retail store. The paper suggests a data mining model which has been used for forecasting of demand. The proposed model has been applied for forecasting demands of eight SKUs for grocery items in a supermarket. Based on the proposed forecasting model, the inventory performance has been studied with simulation. Findings – The proposed forecasting model with the inventory replenishment system results in the reduction of inventory level and increase in customer service level. Hence, the proposed model in the paper","author":[{"dropping-particle":"","family":"Bala","given":"Pradip Kumar","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal

of Modelling in Management","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2012"]]},"page":"23-37","title":"Improving inventory performance with clustering based demand forecasts","type":"article-journal","volume":"7"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Bala, 2012		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"r3unkiRt","properties":{"formattedCitation":"(Marilyn M. Helms, Lawrence P. Ettkin, 2011)","plainCitation":"(Marilyn M. Helms, Lawrence P. Ettkin, 2011)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/5HRqMXsA","uris":["http://www.mendeley.com/	2011	The paper presents the benefits of collaborative forecasting and the problems of the traditional forecasting process.

documents/?uuid=f5b071bd-c589-4439-91b8-47100b5a292f"],"uri":["http://www.mendeley.com/documents/?uuid=f5b071bd-c589-4439-91b8-47100b5a292f"],"itemData":{"abstract":"Protein-protein interacting surfaces are usually large and intricate, making the rational design of small mimetics of these interfaces a daunting problem. On the basis of a structural similarity between the CDR2-like loop of CD4 and the beta-hairpin region of a short scorpion toxin, scyllatoxin, we transferred the side chains of nine residues of CD4, central in the binding to HIV-1 envelope glycoprotein (gp120), to a structurally homologous region of the scorpion toxin scaffold. In competition experiments, the

resulting 27-amino acid miniprotein inhibited binding of CD4 to gp120 with a 40 microM IC(50). Structural analysis by NMR showed that both the backbone of the chimeric beta-hairpin and the introduced side chains adopted conformations similar to those of the parent CD4. Systematic single mutations suggested that most CD4 residues from the CDR2-like loop were reproduced in the miniprotein, including the critical Phe-43. The structural and functional analysis performed suggested five additional mutations that, once incorporated in the miniprotein, increased its affinity for gp120 by 100-fold to an IC(50) of 0.1-1.0 microM, depending on viral strains. The resulting mini-CD4 inhibited infection of CD4(+) cells by different virus isolates. Thus, core regions of large

protein-protein interfaces can be reproduced in miniprotein scaffolds, offering possibilities for the development of inhibitors of protein-protein interactions that may represent useful tools in biology and in drug discovery.","author":[{"dropping-particle":"","family":"Marilyn M. Helms, Lawrence P. Ettkin","given":"Sharon Chapman","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Business Process Management Journal,","id":"ITEM-1","issued":{"date-parts":[["2011"]]},"page":"392.407","title":"Supply chain forecasting Collaborative forecasting supports supply chain management Marilyn","type":"article-journal","volume":"6"}},"

schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Marilyn M. Helms, Lawrence P. Ettkin, 2011		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"ELt3MX7g","properties":{"formattedCitation":"(Mohammadi and Minaei, 2019c)","plainCitation":"(Mohammadi and Minaei, 2019c)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/xU6WoEZ5","uris":["http://www.mendeley.com/documents/?uuid=0aef3a37-696f-48dd-bc93-5ad928ad5313"],"uri":["http://www.mendeley.com/documents/?uuid=0aef3a37-696f-48dd-bc93-5ad928ad5313"],"itemData":{"DOI":"10.1016/	2019	Provides an overview of the various AI methods. The concepts, fundamentals, the reported applications of each method, the used structures, algorithms, and functions are presented.

B978-0-12-815258-4.00002-0","ISBN":"9780128152584","abstract":"By promoting novel and accurate sensor technologies and progress of computing methods to the forefront of intelligence, the use of smart manufacturing lines has been made possible. Smart manufacturing benefits from artificial intelligence that monitors, analyzes, and makes proper decisions instead of human operators. The seminal smart manufacturing technologies include big data processing capabilities, industrial connectivity devices, and services, as well as robotic systems. Therefore, it changes the way that products are manufactured, packed, shipped, and sold. The final goal is to develop machines having the human intelligence to mimic the

decision-making process by humans. However, this does not mean to remove human completely from the production process, but replacing accurate, tireless, and fast machines with humans to optimize the production. This chapter discusses the basic concepts of artificial intelligence techniques and their applications in beverage science and technology.","author":[{"dropping-particle":"","family":"Mohammadi","given":"Vahid","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Minaei","given":"Saeid","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Engineering Tools in the Beverage Industry","id":"ITEM-1","issued":{"date-parts":[["2019"]]},"number-of-

pages":"27-63","publisher":"Elsevier Inc.","title":"Artificial Intelligence in the Production Process","type":"book"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Mohammadi and Minaei, 2019

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"IaFY0vkt","properties":{"formattedCitation":"(Scharl, 1995)","plainCitation":"(Scharl, 1995)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/dSf1A89W","uris":["http://www.mendeley.com/documents/?uuid=3f929bbe-c840-4942-83c3-a96724f686bd"],"uri":["http://www.mendeley.com/documents/?uuid=3f929bbe-c840-

1995 Reviews the AI applications for the electricity supply industry with two case studies: an expert system for security monitoring and applications of neural networks to voltage collapse monitoring.

4942-83c3-a96724f686bd"],"itemData":{"author":[{"dropping-particle":"","family":"Scharl","given":"Arno","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Department of Sports Sciences","id":"ITEM-1","issued":{"date-parts":[["1995"]]},"title":"Applications of Artificial Intelligence in the Sports Sciences","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Scharl, 1995

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"rrggez09","properties":{"formattedCitation":"(Baryannis et al., 2018)","plainCitation":"(Baryannis et al., 2018)","dontUpdate":tru

2018 Provides a comprehensive review of the SC literature addressing -SC risk management related issues using AI spectrum approaches.

e,"noteIndex":0},"citation Items":[{"id":"fJ2LYHh2/ AOTOKFz6","uris": ["http:// www.mendeley.com/ documents/? uuid=01757872-541a- 49b8-9acb- 27b982355d52"],"uri": ["http:// www.mendeley.com/ documents/? uuid=01757872-541a- 49b8-9acb- 27b982355d52"],"itemD ata": {"DOI":"10.1080/002075 43.2018.1530476","ISS N":"0020- 7543","abstract":"Supply chain risk management (SCRM) encompasses a wide variety of strategies aiming to identify, assess, mitigate and monitor unexpected events or conditions which might have an impact, mostly adverse, on any part of a supply chain. SCRM strategies often depend on rapid and adaptive decision- making based on potentially large,

multidimensional data sources. These characteristics make SCRM a suitable application area for artificial intelligence (AI) techniques. The aim of this paper is to provide a comprehensive review of supply chain literature that addresses problems relevant to SCRM using approaches that fall within the AI spectrum. To that end, an investigation is conducted on the various definitions and classifications of supply chain risk and related notions such as uncertainty. Then, a mapping study is performed to categorise existing literature according to the AI methodology used, ranging from mathematical programming to Machine Learning and Big Data Analytics, and the specific SCRM task they addre...","author":

[{"dropping-particle":"","family":"Baryannis","given":"George","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Validi","given":"Sahar","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Dani","given":"Samir","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Antoniou","given":"Grigoris","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Research","id":"ITEM-1","issue":"0","issued":{"date-parts":[["2018"]]},"page":"1-24","publisher":"Taylor & Francis","title":"Supply chain risk management and artificial intelligence:

state of the art and future research directions","type":"article-journal","volume":"0"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Baryannis et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"htKQLxFu","properties":{"formattedCitation":"(Min, 2010)","plainCitation":"(Min, 2010)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/U2PJXLox","uris":["http://www.mendeley.com/documents/?uuid=9045658d-14c3-4a79-88a5-a15be3ee1a19"],"uri":["http://www.mendeley.com/documents/?uuid=9045658d-14c3-4a79-88a5-	2010	This article explores different AI sub-fields that are ideally suited to overcoming SCM-related practical issues. It defines the most fruitful areas of SCM where AI can be applied.

a15be3ee1a19"],"itemData":{"DOI":"10.1080/13675560902736537","ISBN":"1367556090","ISSN":"13675567","abstract":"Artificial intelligence (AI) was introduced to develop and create othinking machineso that are capable of mimicking, learning, and replacing human intelligence. Since the late 1970s, AI has shown great promise in improving human decision-making processes and the subsequent productivity in various business endeavors due to its ability to recognise business patterns, learn business phenomena, seek information, and analyse data intelligently. Despite its widespread acceptance as a decision-aid tool, AI has seen limited application in supply chain management (SCM). To fully exploit the potential benefits of

AI for SCM, this paper explores various sub-fields of AI that are most suitable for solving practical problems relevant to SCM. In so doing, this paper reviews the past record of success in AI applications to SCM and identifies the most fruitful areas of SCM in which to apply AI.","author":[{"dropping-particle":"","family":"Min","given":"Hokey","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Logistics Research and Applications","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2010"]]},"page":"13-39","title":"Artificial intelligence in supply chain management: Theory and applications","type":"article-journal","volume":"13"}}],"schema":"https://

github.com/citation-style-language/schema/raw/master/csl-citation.json"}Min, 2010			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"NAVHVYD4","properties":{"formattedCitation":"(Arunachalam et al., 2018)","plainCitation":"(Arunachalam et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/uf8LzZ2T","uris":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"uri":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"itemData":{"DOI":"10.1016/j.tre.2017.04.001","ISSN":"13665545","abstract":"In the era of Big Data, many organisations have successfully leveraged Big Data	2018	The article discusses BDA SC capacities and offers direction for future study. It Contributes to the continuing discussion of BDA in this field.	BDA

Analytics (BDA) capabilities to improve their performance. However, past literature on BDA have put limited focus on understanding the capabilities required to extract value from big data. In this context, this paper aims to provide a systematic literature review of BDA capabilities in supply chain and develop the capabilities maturity model. The paper presents the bibliometric and thematic analysis of research papers from 2008 to 2016. This paper contributes in theorizing BDA capabilities in context of supply chain, and provides future direction of research in this field.","author":[{"dropping-particle":"","family":"Arunachalam","given":"Deepak","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kum

ar","given":"Niraj","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kawalek","given":"John Paul","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Part E: Logistics and Transportation Review","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"page":"416-436","publisher":"Elsevier Ltd","title":"Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice","type":"article-journal","volume":"114"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Arunachal

am et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"16TOkv2F","properties":{"formattedCitation":"(Addo-Tenkorang and Helo, 2016)","plainCitation":"(Addo-Tenkorang and Helo, 2016)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/UAeANxr8","uris":["http://www.mendeley.com/documents/?uuid=3b4fb49e-a3f8-4ee4-bf13-12aadea221f7"],"uri":["http://www.mendeley.com/documents/?uuid=3b4fb49e-a3f8-4ee4-bf13-12aadea221f7"],"itemData":{"DOI":"10.1016/j.cie.2016.09.023","ISBN":"03608352","ISSN":"03608352","PMID":"119847662","abstract":"Purpose Big data is increasingly becoming a major organizational	2016	The article provides initial literature review studies on ‘‘BD” problems, trends and perspectives in SCM in order to provide a framework IOT – Value-adding.

enterprise force to reckon with in this global era for all sizes of industries. It is a trending new enterprise system or platform which seemingly offers more features for acquiring, storing and analysing voluminous generated data from various sources to obtain value-additions. However, current research reveals that there is limited agreement regarding the performance of “big data.” Therefore, this paper attempts to thoroughly investigate “big data,” its application and analysis in operations or supply-chain management, as well as the trends and perspectives in this research area. This paper is organized in the form of a literature review, discussing the main issues of “big data” and its extension into “big data II”/IoT–value-adding perspectives by

proposing a value-adding framework. Methodology/research approach The research approach employed is a comprehensive literature review. About 100 or more peer-reviewed journal articles/conference proceedings as well as industrial white papers are reviewed. Harzing Publish or Perish software was employed to investigate and critically analyse the trends and perspectives of “big data” applications between 2010 and 2015. Findings/results The four main attributes or factors identified with “big data” include – big data development sources (Variety – V1), big data acquisition (Velocity – V2), big data storage (Volume – V3), and finally big data analysis (Veracity – V4). However, the study of “big data” has evolved and expanded a lot based on its application

and implementation processes in specific industries in order to create value (Value-adding – V5) – “Big Data cloud computing perspective/Internet of Things (IoT)”. Hence, the four Vs of “big data” is now expanded into five Vs. Originality/value of research This paper presents original literature review research discussing “big data” issues, trends and perspectives in operations/supply-chain management in order to propose “Big data II” (IoT – Value-adding) framework. This proposed framework is supposed or assumed to be an extension of “big data” in a value-adding perspective, thus proposing that “big data” be explored thoroughly in order to enable industrial managers and businesses executives to make pre-informed strategic operational and management

decisions for increased return-on-investment (ROI). It could also empower organizations with a value-adding stream of information to have a competitive e…","author":[{"dropping-particle":"","family":"Addo-Tenkorang","given":"Richard","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Helo","given":"Petri T.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Computers and Industrial Engineering","id":"ITEM-1","issued":{"date-parts":[["2016"]]},"page":"528-543","publisher":"Elsevier Ltd","title":"Big data applications in operations/supply-chain management: A literature review","type":"article-journal","volume":"101"}}

],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Addo-Tenkorang and Helo, 2016

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"YstXsr8f","properties":{"formattedCitation":"(Govindan et al., 2018)","plainCitation":"(Govindan et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/fecN86ho","uris":["http://www.mendeley.com/documents/?uuid=f3c1284a-07c6-46c4-8679-2bffcfbb20b3"],"uri":["http://www.mendeley.com/documents/?uuid=f3c1284a-07c6-46c4-8679-2bffcfbb20b3"],"itemData":{"DOI":"10.1016/j.tre.2018.03.011","ISSN":"13665545","abstract":"This special issue

2018

The paper analyzes a range of possibilities for enhancing BDA for SCM applications with data-driven SCs.

explores big data analytics and applications for logistics and supply chain management by examining novel methods, practices, and opportunities. The articles present and analyse a variety of opportunities to improve big data analytics and applications for logistics and supply chain management, such as those through exploring technology-driven tracking strategies, financial performance relations with data driven supply chains, and implementation issues and supply chain capability maturity with big data. This editorial note summarizes the discussions on the big data attributes, on effective practices for implementation, and on evaluation and implementation methods.","author":[{"dropping-particle":"","family":"Govi

ndan","given":"Kannan",
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Logistics and
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[["2018"]]},"page":"343-
349","title":"Big data
analytics and application
for logistics and supply
chain

management","type":"article-journal","volume":"114"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Govindan et al., 2018

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"gW7CciFP","properties":{"formattedCitation":"(Nguyen et al., 2018)","plainCitation":"(Nguyen et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/U3AB4Lvt","uris":["http://www.mendeley.com/documents/?uuid=d2314f52-72c4-46bf-95d6-025009ea7e97"],"uri":["http://www.mendeley.com/documents/?uuid=d2314f52-72c4-46bf-95d6-025009ea7e97"],"itemData":{"DOI":"10.1016/j.cor.2017.07.004","ISB

2018 It contributes with a new classification framework providing a comprehensive image of current literature on where and how BDA was applied in the SCM context.

N":"0305-0548","ISSN":"03050548","PMID":"21688106","abstract":"The rapidly growing interest from both academics and practitioners in the application of big data analytics (BDA) in supply chain management (SCM) has urged the need for review of up-to-date research development in order to develop a new agenda. This review responds to the call by proposing a novel classification framework that provides a full picture of current literature on where and how BDA has been applied within the SCM context. The classification framework is structurally based on the content analysis method of Mayring (2008), addressing four research questions: (1) in what areas of SCM is BDA being applied? (2) At what level of analytics is BDA used in

these SCM areas? (3) What types of BDA models are used in SCM? (4) What BDA techniques are employed to develop these models? The discussion tackling these four questions reveals a number of research gaps, which leads to future research directions.","author":[{"dropping-particle":"","family":"Nguyen","given":"Truong","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"ZHOU","given":"Li","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Spiegler","given":"Virginia","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ieromonachou","given":"Petros","non-dropping-

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ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"6RpbfQlr","properties":{"formattedCitation":"(Lamba and Singh, 2017b)","plainCitation":"

2017 This work describes some frameworks that will facilitate the inclusion of the 3 V BD model in some significant undiscussed O&SCM fields. It explores the present status of BD studies in procurement, production, and logistics.

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ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"yxfQLWHp","properties":{"formattedCitation":"(Chavez et al., 2017)","plainCitation":"(Chavez et al., 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/A8jBOkiH","uris":["http://

2017 This research confirms the connection between DDSC and various dimensions of manufacturing capacity. Furthermore, this study provides insight into the relationship between manufacturing capacity and customer satisfaction. It, also, provides a holistic perspective of BDA.

www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"uri":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"itemData":{"DOI":"10.1080/09537287.2017.1336788","ISSN":"13665871","abstract":"While recent conceptual research and consultancy white papers have\nsuggested that analysing and interpreting data in the supply chain could\npotentially lead to the creation of competitive advantage, its\nexploratory nature demands empirical investigation. Drawing upon the\nresource-based view, this study empirically investigates the linkages\nbetween data-driven supply chains, manufacturing

capability and customer\nsatisfaction. The survey data for this study were gathered from China's\nmanufacturing industry and analysed using structural equation modelling.\nResults suggest that data-driven supply chains are positively associated\nwith multiple manufacturing capability dimensions (i.e. quality,\ndelivery, flexibility and cost), which in turn, lead to customer\nsatisfaction improvement. While delivery appears to have no significant\neffect on customer satisfaction, quality, flexibility and cost are\nsignificantly and positively associated with customer satisfaction. This\nstudy provides insight into the connection between supply chain big data\nintelligence and both operational and organisational

performance\
nimprovement.","author"
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& Francis","title":"Data-driven supply chains, manufacturing capability and customer satisfaction","type":"article-journal","volume":"28"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Chavez et al., 2017		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"gyYCaiSJ","properties":{"formattedCitation":"(Ardalan and Ardalan, 2009)","plainCitation":"(Ardalan and Ardalan, 2009)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/hTuDF90H","uris":["http://www.mendeley.com/documents/?uuid=e49f432b-67ea-4120-b669-f8eab319af1c"],"uri":["http://www.mendeley.com/documents/?](#)	2009	This article discusses the role of data structures in SCM software and develops a data structure that can be used in the scheduling routine of SCM systems.

uuid=e49f432b-67ea-4120-b669-f8eab319af1c"],"itemData":{"DOI":"10.1108/02635570910926636","ISBN":"1355251081087","ISSN":"02635577","abstract":"Purpose - Efficient operation of supply chain management (SCM) software is highly dependent on performance of its data structures that are used for data storage and retrieval. Each module in the software should use data structures that are appropriate for the types of operations performed in that module. The purpose of this paper is to develop and introduce an efficient data structure for storage and retrieval of data related to capacity of resources. Design/methodology/approach - A major aim of supply management systems is timely production and delivery of products. This paper

reviews data structures and designs an efficient data structure for storage and retrieval of data that is used in the scheduling module of SCM software. Findings - This paper introduces a new data structure and search and update algorithms. This data structure can be used in SCM software to record the availability of non-storable resources. Originality/value - This is the first paper that discusses the role of data structures in SCM software and develops a data structure that can be used in the scheduling routine of SCM systems. Scheduling is one of the complex modules of SCM software. Some of the special characteristics related to capacity of resources to develop a data structure that can be efficiently searched and updated as part of scheduling routines were used in

the new data structure. This data structure is a modified version of threaded height-balanced binary search tree. Each node in the proposed tree has one more key than a node in the ordinary threaded height-balanced binary search tree. The available algorithms in the literature on search and update operations on height-balanced binary search trees are modified to suit the proposed tree. © Emerald Group Publishing Limited.","author":[{"dropping-particle":"","family":"Ardalan","given":"Ali","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ardalan","given":"Roya","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Industrial

Management and Data Systems","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2009"]]},"page":"138-150","title":"A data structure for supply chain management systems","type":"article-journal","volume":"109"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Ardalan and Ardalan, 2009		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"YBPJEFoK","properties":{"formattedCitation":"(Aryal et al., 2018)","plainCitation":"(Aryal et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/QrhilpQz","uris":["http://www.mendeley.com/documents/?uuid=f91c2de3-0e7f-4e40-9842-bf9da689740d"],"uri":["http://	2018	This paper presents a text mining analytics method for the literature review. This paper covered the disruptive technologies used in computer science, management science and information systems.

www.mendeley.com/documents/?uuid=f91c2de3-0e7f-4e40-9842-bf9da689740d"],"itemData":{"DOI":"10.1108/SCM-03-2018-0149","ISSN":"13598546","author":[{"dropping-particle":"","family":"Aryal","given":"Arun","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Liao","given":"Ying","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Nattuthurai","given":"Prasnna","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Li","given":"Bo","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITE

M-1","issued":{"date-parts":[["2018"]]},"title":"The emerging big data analytics and IoT in supply chain management: a systematic review","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Aryal et al., 2018

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"GmPdeRwT","properties":{"formattedCitation":"(Sahay and Ranjan, 2008)","plainCitation":"(Sahay and Ranjan, 2008)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ekkDiElg","uris":["http://www.mendeley.com/documents/?uuid=de81909f-8962-4111-862d-405a481e206a"],"uri":["http://www.mendeley.com/

2008 This paper discusses the necessity to revisit the traditional BI concept that integrates and consolidates information in an organization in order to support firms looking for customer loyalty and retention.

documents/?uuid=de81909f-8962-4111-862d-405a481e206a"],"itemData":{"DOI":"10.1108/09685220810862733","ISSN":"09685227","abstract":"Purpose – Rapid innovation and globalization have generated tremendous opportunities and choices in the marketplace for firms and customers. Competitive pressures have led to sourcing and manufacturing on a global scale resulting in a significant increase in products. The paper tries to identify the need for real time business intelligence (BI) in supply chain analytics.","author":[{"dropping-particle":"","family":"Sahay","given":"B. S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ranj

an","given":"Jayanthi","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Information Management and Computer Security","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2008"]]},"page":"28-48","title":"Real time business intelligence in supply chain analytics","type":"article-journal","volume":"16"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Sahay and Ranjan, 2008

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"gEm0f0DH","properties":{"formattedCitation":"(Piecyk and Bjorklund, 2015)","plainCitation":"(Piecyk and Bjorklund, 2015)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/

2015 The authors discuss the way BD is employed across the SC, uncover BD's potential to influence SC performance, and detail the obstacles to developing BD's potential.

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{"date-parts": [["2015"]]},"number-of-pages":"459-485","title":"International Journal of Physical Distribution & Logistics Management Article information : To cite this document :","type":"book","volume":"45"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Piecyk and Bjorklund, 2015		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"h4pob4Or","properties": {"formattedCitation":"(Wang and Ha-Brookshire, 2018a)","plainCitation":"(Wang and Ha-Brookshire, 2018a)","dontUpdate":true,"noteIndex":0},"citationItems": [{"id":"fJ2LYHh2/aMmGA9sj","uris": ["http://www.mendeley.com/documents/?uuid=c6f818a5-8312-4774-861c-	2018	The article provides academic programs with an up-to date and timely assessment of potential industry workforce needs, allowing educators to make necessary changes to better prepare students with the required skill sets.

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www.mendeley.com/
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a":
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66.2018.1448459","ISB
N":"1754-
3266","ISSN":"1754327
4","abstract":"ABSTRAC
TTo assess today's
fashion employers’
needs for digital
competency, this study
explored the employee
competency
requirements per
fashion supply chain
function. The content
analysis results of 649
job advertisements
posted on
StyleCareers.com in
2016 showed various
digital competency
requirements amongst 7
fashion supply chain
functions. The initial
stages of the fashion
business cycle, such as
forecasting, consumer
research, and design,

required a higher level of digital competency from employees than the final stages, such as production/sourcing and retailing/distribution. The finding showed a glimpse of the potential needs for digital intelligence that may be required by each fashion supply chain function to get ready for Industry 4.0. The finding calls for the need to build a framework for Fashion Industry 4.0 competency. This study's results may help employers and employees be better prepared for the Industry 4.0 and guide the training and education for the future workforce.","author":[{"dropping-particle":"","family":"Wang","given":"Baolu","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ha-Brookshire","given":"Jun

g E.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Fashion Design, Technology and Education","id":"ITEM-1","issue":"3","issued":{"date-parts":[["2018"]]},"page":"333-342","publisher":"Taylor & Francis","title":"Exploration of Digital Competency Requirements within the Fashion Supply Chain with an Anticipation of Industry 4.0","type":"article-journal","volume":"11"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Wang and Ha-Brookshire, 2018a

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"bvFxnIht","properties":{"formattedCitation":"(Hofmann and Rutschmann, 2018 This paper contributes to the literature by analyzing the relation of forecasting methods to BDA. This paper provides advice on how enterprises can employ BDA in their operational, tactical, or strategic demand plans.

2018)","plainCitation":"(Hofmann and Rutschmann, 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/lTAwX13d","uris":["http://www.mendeley.com/documents/?uuid=99de8282-319b-4459-a891-d57c0aea949d"],"uri":["http://www.mendeley.com/documents/?uuid=99de8282-319b-4459-a891-d57c0aea949d"],"itemData":{"DOI":"10.1108/IJLM-04-2017-0088","ISSN":"17586550","abstract":"We have performed multiscale simulations of the growth of graphene on defect-free copper (111) in order to model the nucleation and growth of graphene flakes during chemical vapour deposition and potentially guide future experimental work. Basic activation

energies for atomic surface diffusion were determined by ab initio calculations. Larger scale growth was obtained within a kinetic Monte Carlo approach (KMC) with parameters based on the ab initio results. The KMC approach counts the first and second neighbours to determine the probability of surface diffusion. We report qualitative results on the size and shape of the graphene islands as a function of deposition flux. The dominance of graphene zigzag edges for low deposition flux, also observed experimentally, is explained by its larger dynamical stability that the present model fully reproduced.","author":[{"dropping-particle":"","family":"Hofmann","given":"Erik","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-

particle":"","family":"Rutschmann","given":"Emanuel","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Logistics Management","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2018"]]},"page":"739-766","title":"Big data analytics and demand forecasting in supply chains: a conceptual analysis","type":"article-journal","volume":"29"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Hofmann and Rutschmann, 2018

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"lzUlJHUl","properties":{"formattedCitation":"(Accorsi et al., 2018)","plainCitation":"(Accorsi et al., 2018)","dontUpdate":tru

2018 This paper illustrates a framework for the design of a database aiding the assessment, planning and design of food production and distribution operations over a large scale area and strategic perspective.

e,"noteIndex":0},"citation Items":[{"id":"fJ2LYHh2/ cXYdqESA","uris": ["http:// www.mendeley.com/ documents/? uuid=b02656cd-8345- 438e-8c99- aafb31ecf4af"],"uri": ["http:// www.mendeley.com/ documents/? uuid=b02656cd-8345- 438e-8c99- aafb31ecf4af"],"itemDat a":{"DOI":"10.1016/ j.jclepro.2018.08.275","I SSN":"09596526","abstr act":"The agro-food industry is one of the largest parts of the European Union's economy and faces economic and environmental stresses. While food traceability systems (FTSs) inform supply chain actors of product and logistical attributes, large scale implementations are scarce and are do not support active decision making. We present a framework developed

for FUTUREMED project used to perform a data-driven analysis that considers both micro and macro aspects of a food supply chain (FSC). With its comprehensive multiple-depth data architecture incorporated within a tailored decision-support platform, this framework and the resulting decision-support tool is the first to move beyond simple traceability implementation to the sustainable planning of food logistics, bridging the gap between research techniques and real-world data availability. We define KPIs that measure a subset of economic and environmental factors to quantify the impact of logistical decisions. We validate the framework with the case study of an Italian fruit trader that is considering opening a new warehouse. We conclude by suggesting that this framework be

applied to more complex case studies and be enhanced through including more dimensions of sustainability.","author":[{"dropping-particle":"","family":"Accorsi","given":"Riccardo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Cholette","given":"Susan","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Manzini","given":"Riccardo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Tufano","given":"Alessandro","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Cleaner Production","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"page":"1039-

1054","publisher":"Elsevier Ltd","title":"A hierarchical data architecture for sustainable food supply chain management and planning","type":"article-journal","volume":"203"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Accorsi et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"49zSkKCx","properties":{"formattedCitation":"(Engelseth and Wang, 2018)","plainCitation":"(Engelseth and Wang, 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/7SeqkuJr","uris":["http://www.mendeley.com/documents/?uuid=29466836-7699-4d9c-ab25-c0ffc08599ab"],"uri":["http://www.mendeley.com/	2018	The research project is about to study information technology use in the inherently complex setting and scope of a long linked supply network. This scope of investigation enhances to use BD to mitigate risk in long linked SCs.

documents/?uuid=29466836-7699-4d9c-ab25-c0ffc08599ab"],"itemData":{"DOI":"10.1108/JBIM-07-2017-0168","ISBN":"0720170168","ISSN":"08858624","abstract":"Purpose This study aims to consider the developing of strategic use of\nbig data in association with long-linked physical goods supply focusing\non risk management.\nDesign/methodology/approach Analysis is grounded on a case study of\norganizing the import of machine parts from Shanghai, China, to Norway.\nAn analytical framework is developed through a literature review on long\nlinked supply chains, big data and risk management.\nFindings Analysis reveals that big data use in this scenario encompasses\nmainly around handling risks associated with transformations in the\

nsupply chain, a data-driven approach. Complexity is founded in\ntransformation - the flows of goods and information. Supply chain\ndynamics represent an important source for data acquisition for big data\nanalytics.\nResearch limitations/implications The qualitative nature of the study\nlimits the aim of generalization. An alternative view of big data as\nprocess is discussed and proposed, adapted to supply chain management\nand industrial marketing functionality.\nOriginality/value This is the first part in an ongoing research project\naimed at developing a research approach to study information technology\nuse in the inherently complex setting and scope of a long linked supply\nnetwork. This scope of investigation

enhances big data associated with\ noperations dynamics providing foundation for future research on how to\nuse big data to mitigate risk in long linked supply chains.","author":[{"dropping-particle":"","family":"Engelseth","given":"Per","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Hao","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Business and Industrial Marketing","id":"ITEM-1","issue":"8","issued":{"date-parts":[["2018"]]},"page":"1201-1208","title":"Big data and connectivity in long-linked supply chains","type":"article-journal","volume":"33"}}],"schema":"https://github.com/citation-

style-language/schema/raw/master/csl-citation.json"}Engelseth and Wang, 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"T8ISxzii","properties":{"formattedCitation":"(Chaudhuri et al., 2018)","plainCitation":"(Chaudhuri et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/k2DONBxO","uris":["http://www.mendeley.com/documents/?uuid=ee87db0f-dbb4-449a-a858-907e8b91f1a4"],"uri":["http://www.mendeley.com/documents/?uuid=ee87db0f-dbb4-449a-a858-907e8b91f1a4"],"itemData":{"DOI":"10.1108/IJLM-03-2017-0059","ISSN":"17586550","abstract":"Purpose The purpose of the paper is to identify the	2018	This paper discusses the need for a comprehensive assessment for the adoption and application of data analytics in cold chain management and provides directions for future research.

multiple types of data that can be collected and analyzed by practitioners across the cold chain, the ICT infrastructure required to enable data capture and how to utilize the data for decision making in cold chain logistics.Design/methodology/approach Content analysis based literature review of 38 selected research articles, published between 2000 and 2016, was used to create an overview of data capture, technologies used for collection and sharing of data, and decision making that can be supported by the data, across the cold chain and for different types of perishable food products.Findings There is a need to understand how continuous monitoring of conditions such as temperature, humidity, and vibration can be translated to support real-time

assessment of quality, determination of actual remaining shelf life of products and use of those for decision making in cold chains. Firms across the cold chain need to adopt appropriate technologies suited to the specific contexts to capture data across the cold chain. Analysis of such data over longer periods can also unearth patterns of product deterioration under different transportation conditions, which can lead to redesigning the transportation network to minimize quality loss or to take precautions to avoid the adverse transportation conditions.Research limitations/implications The findings need to be validated through further empirical research and modeling. There are opportunities to identify all relevant parameters to capture product

condition as well as transaction data across the cold chain processes for fish, meat and dairy products. Such data can then be used for supply chain (SC) planning and pricing products in the retail stores based on product conditions and traceability information. Addressing some of the above research gaps will call for multi-disciplinary research involving food science and engineering, information technologies, computer science and logistics and SC management scholars.Practical implications The findings of this research can be beneficial for multiple players involved in the cold chain like food processing companies, logistics service providers, ports and wholesalers and retailers to understand how data can be effectively used for

better decision making in cold chain and to invest in the specific technologies, which will suit the purpose. To ensure adoption of data analytics across the cold chain, it is also important to id…","author":[{"dropping-particle":"","family":"Chaudhuri","given":"Atanu","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Dukovska-Popovska","given":"Iskra","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Subramanian","given":"Nachiappan","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Chan","given":"Hing Kai","non-dropping-particle":"","parse-names":false,"suffix":""},

{"dropping-particle":"","family":"Bai","given":"Ruibin","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Logistics Management","id":"ITEM-1","issue":"3","issued":{"date-parts":[["2018"]]},"page":"839-861","title":"Decision-making in cold chain logistics using data analytics: a literature review","type":"article-journal","volume":"29"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Chaudhuri et al., 2018

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"PyGDJ7Zo","properties":{"formattedCitation":"(Yudi Fernando Ika Sari Wahyuni-TD and Article, 2017)","plainCitation":"(

2017 This paper proposes model service for SC performance by examining the effect of BDA, data security, and SC innovation capabilities.

Yudi Fernando Ika Sari Wahyuni-TD and Article, 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/OA8T7P1L","uris":["http://www.mendeley.com/documents/?uuid=8409565b-35c6-419f-9e73-de4fa31f6336"],"uri":["http://www.mendeley.com/documents/?uuid=8409565b-35c6-419f-9e73-de4fa31f6336"],"itemData":{"author":[{"dropping-particle":"","family":"Yudi Fernando Ika Sari Wahyuni-TD","given":"Ramanathan R M Chidambaram","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Article","given":"","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-

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ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"fxtcbeNj","properties":{"formattedCitation":"(Huang and Xue, 2012)","plainCitation":"(Huang and Xue, 2012)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/j2zuyjTu","uris":["http://

	2012	This paper bridges the gap between academic theoretical studies and practical realization through the case study of JCH, which can encourage and lead to avoid deficient or erroneous grounds in the planning, implementation and evaluation of cluster SC.

www.mendeley.com/documents/?uuid=ca8a5461-3c8f-4e35-b19b-68fce35c6023"],"uri":["http://www.mendeley.com/documents/?uuid=ca8a5461-3c8f-4e35-b19b-68fce35c6023"],"itemData":{"DOI":"10.1108/03684921211213070","ISSN":"0368492X","abstract":"Iron and steel industry is a major industrial waste emitter in China, which is of the basis, potential and practical significance to construct reverse supply chain system owing to the higher recycling value of waste iron and steel. With the theory of reverse supply chain coordination management and comprehensive performance evaluation of circular economy, this paper study the internal and external reverse supply chain modules of

iron and steel industry and their integration from the perspective of the internal and external coordination innovation management. An evaluation model of reverse supply chain system is constructed for the sake of evaluating the construction progress of reverse supply chain in iron and steel industry. With the case of Baoshan iron & steel firm, using the above models, this paper analyzes and evaluates the progress of reverse supply chain construction. The results show that, firstly, the built steel reverse supply chain system and evaluation models may reflect and evaluate the construction progress of reverse supply chain system in Baoshan iron & steel firm; secondly, it has a value of reference and great significance to improve the construction

of reverse supply chain system in iron and steel industry.","author":[{"dropping-particle":"","family":"Huang","given":"Biqing","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Xue","given":"Xiao","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Kybernetes","id":"ITEM-1","issue":"1-2","issued":{"date-parts":[["2012"]]},"page":"254-280","title":"An application analysis of cluster supply chain: A case study of JCH","type":"article-journal","volume":"41"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Huang and Xue, 2012		
ADDIN ZOTERO_ITEM CSL_CITATION	2018	The article summarizes the discussions about the BD attributes, effective practices for implementation, and evaluation and implementation methods.

{"citationID":"kbZJNNsS","properties":{"formattedCitation":"(Govindan et al., 2018)","plainCitation":"(Govindan et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/fecN86ho","uris":["http://www.mendeley.com/documents/?uuid=f3c1284a-07c6-46c4-8679-2bffcfbb20b3"],"uri":["http://www.mendeley.com/documents/?uuid=f3c1284a-07c6-46c4-8679-2bffcfbb20b3"],"itemData":{"DOI":"10.1016/j.tre.2018.03.011","ISSN":"13665545","abstract":"This special issue explores big data analytics and applications for logistics and supply chain management by examining novel methods, practices, and opportunities. The articles present and analyse a variety of

opportunities to improve big data analytics and applications for logistics and supply chain management, such as those through exploring technology-driven tracking strategies, financial performance relations with data driven supply chains, and implementation issues and supply chain capability maturity with big data. This editorial note summarizes the discussions on the big data attributes, on effective practices for implementation, and on evaluation and implementation methods.","author":[{"dropping-particle":"","family":"Govindan","given":"Kannan","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Cheng","given":"T. C.E.","non-dropping-particle":"","parse-names":false,"suffix":""},

{"dropping-particle":"","family":"Mishra","given":"Nishikant","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Shukla","given":"Nagesh","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Part E: Logistics and Transportation Review","id":"ITEM-1","issue":"March","issued":{"date-parts":[["2018"]]},"page":"343-349","title":"Big data analytics and application for logistics and supply chain management","type":"article-journal","volume":"114"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Govindan et al., 2018

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"QFFuAAXr","properties":{"formattedCitation":"(Wang, Singgih, et al., 2019)","plainCitation":"(Wang, Singgih, et al., 2019)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/XssiPA1E","uris":["http://www.mendeley.com/documents/?uuid=602651f0-682c-413c-bd9d-112b66b19c9b"],"uri":["http://www.mendeley.com/documents/?uuid=602651f0-682c-413c-bd9d-112b66b19c9b"],"itemData":{"DOI":"10.1016/j.ijpe.2019.02.002","ISSN":"09255273","abstract":"This research uses sensemaking theory to explore how emerging blockchain technology may transform supply chains. We investigate three research questions (RQs): What are blockchain	2019	The research offers several valuable insights to SC practitioners for the potential uptake and exploitation of blockchain technology.	Blockchain

technology's perceived benefits to supply chains, where are disruptions mostly likely to occur and what are the potential challenges to further blockchain diffusion? We conducted in-depth interviews with 14 supply chain experts. Cognitive mapping and narrative analysis were deployed as the two main data analysis techniques to aid our understanding and evaluation of people's cognitive complexity in making sense of blockchain technology. We found that individual experts developed different cognitive structures within their own sensemaking processes. After merging individual cognitive maps into a strategic map, we identified several themes and central concepts that then allowed us to explore potential answers to the

three RQs. Our study is among the very few to date to explicitly explore how blockchains may transform supply chain practices. Using the sensemaking approach afforded a deeper understanding of how senior executives diagnose the symptoms evident from blockchains and develop assumptions, expectations and knowledge of the technology, which will then shape their future actions regarding its utilisation. We demonstrate the usefulness of sensemaking theory as an alternative lens in investigating contemporary supply chain phenomena such as blockchains. Bringing sensemaking theory to this discipline in particular enriches emerging behavioural operations research. Our contributions also lie in extending the

theories of prospective sensemaking and adding further insights to the stream of technology adoption studies.","author":[{"dropping-particle":"","family":"Wang","given":"Yingli","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Singgih","given":"Meita","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Jingyao","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Rit","given":"Mihaela","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Economics","id":"ITEM-1","issued":{"date-parts":

[["2019"]]},"page":"221-236","publisher":"Elsevier B.V.","title":"Making sense of blockchain technology: How will it transform supply chains?","type":"article-journal","volume":"211"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Wang, Singgih, et al., 2019		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"y4OOIi5q","properties":{"formattedCitation":"(Casado-Vara et al., 2018)","plainCitation":"(Casado-Vara et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ZcnsAEAp","uris":["http://www.mendeley.com/documents/?uuid=1da9f864-add8-4d1a-b5e4-21831a4e8705"],"uri":["http://www.mendeley.com/	2018	This paper presents a new blockchain approach to improving the current SC. The novelty of this paper lies in applying a real-case study for implementing blockchain technology.

documents/?uuid=1da9f864-add8-4d1a-b5e4-21831a4e8705"],"itemData":{"DOI":"10.1016/j.procs.2018.07.193","ISBN":"9781424441280","ISSN":"18770509","PMID":"12727271","abstract":"Current supply chain is a linear economy model that directly or indirectly fulfills supply needs. But this model has some disadvantages, such as the relationships between the members of the supply chain or the lack of information for the consumer about the origin of the products. In this paper we propose a new model of supply chain via blockchain. This new model enables the concept of circular economy and eliminates many of the disadvantages of the current supply chain. In order to coordinate all the transactions that take place in the supply

chain a multi-agent system is created for this paper.","author":[{"dropping-particle":"","family":"Casado-Vara","given":"Roberto","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Prieto","given":"Javier","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"De","family":"Prieta","given":"Fernando","non-dropping-particle":"La","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Corchado","given":"Juan M.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Procedia Computer Science","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"note":"14","page":"393-

398","publisher":"Elsevier B.V.","title":"How blockchain improves the supply chain: Case study alimentary supply chain","type":"article-journal","volume":"134"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Casado-Vara et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"3715CpT8","properties":{"formattedCitation":"(Min, 2019)","plainCitation":"(Min, 2019)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ujEVYHoS","uris":["http://www.mendeley.com/documents/?uuid=c7138a9a-4012-4fa0-afd0-9b7312ebf6c2"],"uri":["http://www.mendeley.com/documents/?	2019	This article discusses ways to leverage blockchain technology to enhance SC resilience. It identifies specific application areas of BT to SC risk management operations.

uuid=c7138a9a-4012-4fa0-afd0-9b7312ebf6c2"],"itemData":{"DOI":"10.1016/j.bushor.2018.08.012","ISBN":"15403890","ISSN":"00076813","abstract":"With the soaring value of bitcoin and frenzy over cryptocurrency, the blockchain technology that sparked the bitcoin revolution has received heightened attention from both practitioners and academics. Blockchain technology often causes controversies surrounding its application potential and business ramifications. The blockchain is a peer-to-peer network of information technology that keeps records of digital asset transactions using distributed ledgers that are free from control by intermediaries such as banks and governments. Thus, it can mitigate risks associated with

intermediaries’ interventions, including hacking, compromised privacy, vulnerability to political turmoil, costly compliance with government rules and regulation, instability of financial institutions, and contractual disputes. This article unlocks the mystique of blockchain technology and discusses ways to leverage blockchain technology to enhance supply chain resilience in times of increased risks and uncertainty.","author":[{"dropping-particle":"","family":"Min","given":"Hokey","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Business Horizons","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2019"]]},"page":"35-45","publisher":"\"Kelley School of Business, Indiana

University\"","title":"Blockchain technology for enhancing supply chain resilience","type":"article-journal","volume":"62"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Min, 2019

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"BWhEBZKj","properties":{"formattedCitation":"(Wang, Han, et al., 2019)","plainCitation":"(Wang, Han, et al., 2019)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/8j1YqaAN","uris":["http://www.mendeley.com/documents/?uuid=ad24eb79-24e8-444d-b29b-075a18288001"],"uri":["http://www.mendeley.com/documents/?uuid=ad24eb79-24e8-444d-b29b-

2019 This paper is one of the first studies to examine the current state of blockchain diffusion within SCs. It lays a firm foundation for future research.

075a18288001"],"itemData":{"DOI":"10.1108/SCM-03-2018-0148","ISSN":"13598546","abstract":"Purpose – This paper aims to investigate the way in which blockchain technology is likely to influence future supply chain practices and policies. Design/methodology/approach – A systematic review of both academic and practitioner literature was conducted. Multiple accounts of blockchain adoption within industry were also consulted to gain further insight. Findings – While blockchain technologies remain in their infancy, they are gaining momentum within supply chains, trust being the predominant factor driving their adoption. The value of such technologies for supply chain management lies in four areas: extended visibility

and traceability, supply chain digitalisation and disintermediation, improved data security and smart contracts. Several challenges and gaps in understanding and opportunities for further research are identified by this research. How a blockchain-enabled supply chain should be configured has also been explored from a design perspective. Research limitations/implications – This systematic review focuses on the diffusion of blockchain technology within supply chains, and great care was taken in selecting search terms. However, the authors acknowledge that their choice of terms may have excluded certain blockchain articles from this review. Practical implications – This paper offers valuable insight for supply chain practitioners into how

blockchain technology has the potential to disrupt existing supply chain provisions as well as a number of challenges to its successful diffusion. Social implications – The paper debates the poential social and economic impact brought by blockchain. Originality/value – This paper is one of the first studies to examine the current state of blockchain diffusion within supply chains. It lays a firm foundation for future research.","author":[{"dropping-particle":"","family":"Wang","given":"Yingli","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Han","given":"Jeong Hugh","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Bey

non-Davies","given":"Paul","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2019"]]},"page":"62-84","title":"Understanding blockchain technology for future supply chains: a systematic literature review and research agenda","type":"article-journal","volume":"24"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Wang, Han, et al., 2019

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"NEif6q0G","properties":{"formattedCitation":"(Kamble, Gunasekaran and Arha, 2018)","plainCitation":"(Kamble, Gunasekaran	2018	The paper presents a holistic approach for future studies on the adoption of new information science-based technologies.

and Arha,
2018)","dontUpdate":tru
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9d0260e664a4"],"itemD
ata":
{"DOI":"10.1080/002075
43.2018.1518610","ISS
N":"1366588X","abstract
":"Blockchain
technology (BT) is
expected to bring a
revolutionary paradigm
shift in the manner the
transactions are carried
in the supply chains. BT
provides better visibility
and transparency by
removing the
disadvantages of trust
related issues in a
supply chain. In this
paper, we advance the

literature on BT and its adoption in the supply chain by developing, and statistically validating a model for understanding the user perceptions on BT adoption. The model is based on the integration of three adoption theories- technology acceptance model (TAM), technology readiness index (TRI) and the theory of planned behaviour (TPB). Based on a survey of 181 supply chain practitioners in India the proposed model was tested using structural equation modelling. The study found that the TRI constructs- Insecurity and discomfort have an insignificant effect on the perceived ease of use and usefulness. Perceived usefulness, attitude, and perceived behavioural control affect the behavioural intention. Subjective norm has a negligible

impact on behavioural intention. This is one of the preliminary studies on BT adoption in supply chain and the findings imply that the supply chain practitioners perceive BT adoption free of efforts and would help them to derive maximum benefits for improving the supply chain effectiveness. © 2018, © 2018 Informa UK Limited, trading as Taylor & Francis Group.","author":[{"dropping-particle":"","family":"Kamble","given":"Sachin","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Gunasekaran","given":"Angappa","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Arha","given":"Himanshu","non-dropping-particle":"","parse-

names":false,"suffix":""}],"container-title":"International Journal of Production Research","id":"ITEM-1","issue":"0","issued":{"date-parts":[["2018"]]},"page":"1-25","publisher":"Taylor & Francis","title":"Understanding the Blockchain technology adoption in supply chains-Indian context","type":"article-journal","volume":"0"}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Kamble, Gunasekaran and Arha, 2018

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"RE3ssGZ0","properties":{"formattedCitation":"(Queiroz et al., 2019)","plainCitation":"(Queiroz et al., 2019)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/bV3cf3sB","uris":["http://

2019 This study sheds light on the disruption caused by the SCM reconfigurations. This study investigated the current state of blockchain applications in the SCM field.

www.mendeley.com/documents/?uuid=cca3a53f-6ecd-487c-adea-f812f5f84de2"],"uri":["http://www.mendeley.com/documents/?uuid=cca3a53f-6ecd-487c-adea-f812f5f84de2"],"itemData":{"DOI":"10.1108/SCM-03-2018-0143","ISSN":"13598546","abstract":"Purpose – This paper aims to identify, analyse and organise the literature about blockchains in supply chain management (SCM) context (blockchain–SCM integration) and proposes an agenda for future research. This study aims to shed light on what the main current blockchain applications in SCM are, what the main disruptions and challenges are in SCM because of blockchain adoption and what the future of blockchains

holds in SCM. Design/methodology/approach – This study followed the systematic review approach to analyse and synthesise the extant literature on blockchain–SCM integration. The review analysed 27 papers between 2008 and 2018 in peer-reviewed journals. Findings – Blockchain–SCM integration is still in its infancy. Scholars and practitioners are not fully aware of the potential of blockchain technology to disrupt traditional business models. However, the electric power industry seems to have a relatively mature understanding of blockchain–SCM integration, demonstrated by the use of smart contracts. Additionally, the disintermediation provided by blockchain applications has the potential to disrupt traditional industries

(e.g. health care, transportation and retail). Research limitations/implications – The limitations of this study are represented mainly by the scarcity of studies on blockchain–SCM integration in leading journals and databases. Practical implications – This study highlights examples of blockchain–SCM integration, emphasising the need to rethink business models to incorporate blockchain technology. Originality/value – This study is the first attempt to synthesise existing publications about the blockchain–SCM integration, shedding light on the disruption caused by, and the necessity of, the SCM reconfigurations. Keywords","author": [{"dropping-particle":"","family":"Queiroz","given":"Maciel M.","non-dropping-particle":"","parse-

names":false,"suffix":""},{"dropping-particle":"","family":"Telles","given":"Renato","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Bonilla","given":"Silvia H.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-1","issued":{"date-parts":[["2019"]]},"title":"Blockchain and supply chain management integration: a systematic review of the literature","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Queiroz et al., 2019

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"8vZBu3Xy","properties":	2018	This study investigates current TTSs and certification labels and probes customer perception of a potential BCT-based solution for meat traceability.

{"formattedCitation":"(Sander et al., 2018)","plainCitation":"(Sander et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/G6G97qbJ","uris":["http://www.mendeley.com/documents/?uuid=eb448e6f-9a83-4656-9f2f-8075a29514e9"],"uri":["http://www.mendeley.com/documents/?uuid=eb448e6f-9a83-4656-9f2f-8075a29514e9"],"itemData":{"DOI":"10.1108/BFJ-07-2017-0365","ISSN":"0007070X","abstract":"© 2018, Emerald Publishing Limited. Purpose: The purpose of this paper is to investigate meat traceability by outlining the different perspectives and opinions of meat supply chain stakeholders (SCSs); it also evaluates potential of

acceptance of blockchain technology (BCT) as a viable transparency and traceability system (TTS). Design/methodology/approach: A questionnaire survey of 141 consumers reveals their opinions about TTSs. In addition, semi-structured interviews with seven retail managers, four government officials and one blockchain service provider (Project Provenance Ltd) provide expert insights. Findings: The results demonstrate that consumers are overwhelmed by the amount and complexity of certification labels. As a TTS, BCT implementation appears to have significant positive influences on consumers' purchasing decisions, mediated by consumers' quality perceptions. This study reveals the discordant

perspectives of different stakeholders with regard to the importance of a BCT-based TTS. Originality/value: This study investigates current TTSs and certification labels, and probes customer perception of a potential BCT-based solution for meat traceability. Changes to supply chains' mentality and the active establishment of trust in BCT applications are needed. Firms should take both holistic and altruistic views to deal with the challenges of TTSs in the meat supply chain. The adoption of BCT, in combination with DNA coding, seems promising as a solution to many of the issues that currently plague TTSs.","author":[{"dropping-particle":"","family":"Sander","given":"Fabian","non-dropping-particle":"","parse-names":false,"suffix":""},

{"dropping-particle":"","family":"Semeijn","given":"Janjaap","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Mahr","given":"Dominik","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"British Food Journal","id":"ITEM-1","issue":"9","issued":{"date-parts":[["2018"]]},"page":"2066-2079","title":"The acceptance of blockchain technology in meat traceability and transparency","type":"article-journal","volume":"120"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Sander et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"BDqzsjcO"	2018	The article investigates the relationship between SCM and blockchain from a theory-based perspective.

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2018)","plainCitation":"(
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2018)","dontUpdate":tru
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ata":{"DOI":"10.1108/
SCM-01-2018-
0029","ISSN":"1359854
6","abstract":"Purpose
This paper aims to strive
to close the current
research gap pertaining
to potential implications
of the blockchain for
supply chain
management (SCM) by
presenting a framework
built on four established
economic theories,

namely, principal agent theory (PAT), transaction cost analysis (TCA), resource-based view (RBV) and network theory (NT). These theories can be used to derive research questions that are theory-based as well as relevant for the industry. This paper is intended to initiate and stimulate an academic discussion on the potential impact of the blockchain and introduces a framework for middle-range theorizing together with several research questions. Design/methodology/approach This paper builds on previous theories that are frequently used in SCM research and shows how they can be adapted to blockchain-related questions. Findings This paper introduces a framework for middle-range theorizing together with several research	

questions. Research limitations/implications The paper presents bl...","author":[{"dropping-particle":"","family":"Treiblmaier","given":"Horst","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-1","issue":"6","issued":{"date-parts":[["2018"]]},"page":"545-559","title":"The impact of the blockchain on the supply chain: a theory-based research framework and a call for action","type":"article-journal","volume":"23"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Treiblmaier, 2018			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"KTFRKjiG","properties":	2018	This study reveals the determinant factors of the usage level or assimilation of CC in the SC.	CC

{"formattedCitation":"(Manuel Maqueira et al., 2018)","plainCitation":"(Manuel Maqueira et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/FeVIKqvU","uris":["http://www.mendeley.com/documents/?uuid=5b99085b-75e9-4dd7-ab9e-079da78ca44d"],"uri":["http://www.mendeley.com/documents/?uuid=5b99085b-75e9-4dd7-ab9e-079da78ca44d"],"itemData":{"DOI":"10.1080/00207543.2018.1530473","ISSN":"1366588X","abstract":"Cloud Computing are innovative technologies that are being applied in the main business functions in the supply chain. This study aims to reveal the determinant factors (drivers and a relevant outcome) of the level of use or assimilation of

Cloud Computing in the supply chain. In order to test three hypotheses we conducted an empirical study in 484 companies from sectors in an intermediate position in the supply chain. The data gathering method consisted of a telephone survey using a computerised system (CATI). We used structural equation modelling (SEM) to test the hypotheses. The empirical study reveals that Advanced Manufacturing Technologies pursuing the internal efficiency of the supply chain (Intra-organisational IT) and IT for capabilities in e-business/e-commerce seeking external connection of the supply chain with other companies (Inter-organisational IT) are drivers of Cloud Computing assimilation. Furthermore, supply chain integration is one						

of the major consequences of Cloud Computing assimilation in the supply chain. ©2018, ©2018 Informa UK Limited, trading as Taylor & Francis Group.","author":[{"dropping-particle":"","family":"Manuel Maqueira","given":"Juan","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Moyano-Fuentes","given":"José","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Bruque","given":"Sebastián","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Research","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"title":"Drivers and consequences of an

innovative technology assimilation in the supply chain: cloud computing and supply chain integration","type":"article-journal","volume":"7543"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Manuel Maqueira et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"yWpJer3v","properties":{"formattedCitation":"(Howell, 2017)","plainCitation":"(Howell, 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/U0B1GjjI","uris":["http://www.mendeley.com/documents/?uuid=19da59b3-0a49-4562-bb94-8cfd31511577"],"uri":["http://www.mendeley.com/documents/?"	2017	The article discusses the new system based on the I4.0 concepts of interoperability, machine to IT communication and cloud.

uuid=19da59b3-0a49-4562-bb94-8cfd31511577"],"itemData":{"author":[{"dropping-particle":"","family":"Howell","given":"Gelston","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"eeNews Europe","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"page":"3-5","title":"Real-time supply chain management for industry 4.0","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Howell, 2017

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"GI4rQxbG","properties":{"formattedCitation":"(Novais et al., 2019)","plainCitation":"(Novais et al., 2019)","dontUpdate":tru

2019 This paper analyzes the current state of research in CC and SC Integration with the objective to identify research gaps and provide guidance for future research.

e,"noteIndex":0},"citation Items":[{"id":"fJ2LYHh2/ fxutb0eZ","uris":["http:// www.mendeley.com/ documents/? uuid=cbfc0f96-84b1- 4efe-8fa2- f755a4e19cbc"],"uri": ["http:// www.mendeley.com/ documents/? uuid=cbfc0f96-84b1- 4efe-8fa2- f755a4e19cbc"],"itemDa ta":{"DOI":"10.1016/ j.cie.2019.01.056","ISS N":"03608352","abstract ":"This paper analyzes the current state of research into Cloud Computing and Supply Chain Integration with the objective to identify the findings to date, the areas of study developed and research gaps to provide guidance for future research. For this, a Systematic Literature Review was conducted, with 77 papers addressing the Cloud Computing-Supply Chain Integration

relationship identified for analysis. These papers provide evidence of a positive relationship between the adoption of Cloud Computing use in process/activity integration, technology/system integration, and supply chain partner integration. The reviewed literature also indicates that Cloud Computing use in supply chain can also have an impact on the integration of the supply chain's information, physical and/or financial flows.","author":[{"dropping-particle":"","family":"Novais","given":"Luciano","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Maqueira","given":"Juan Manuel","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Orti

z-Bas","given":"Ángel","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Computers and Industrial Engineering","id":"ITEM-1","issued":{"date-parts":[["2019"]]},"page":"296-314","publisher":"Elsevier Ltd","title":"A systematic literature review of cloud computing use in supply chain integration","type":"article-journal","volume":"129"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Novais et al., 2019		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"TQXNvlYf","properties":{"formattedCitation":"(Gonul Kochan et al., 2018)","plainCitation":"(Gonul Kochan et al.,	2018	The authors developed a new dynamics approach, feedback-based structure to model and investigate the behaviour of hospital SCs, and to evaluate the impact of cloud-based information sharing systems.

2018)","dontUpdate":tru
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ata":{"DOI":"10.1016/
j.ijpe.2017.10.008","ISS
N":"09255273","abstract
":"The inadequacies of
traditional information
sharing are amplified in
the healthcare sector.
Poor demand and
inventory visibility result
in demand and supply
mismatch of healthcare
products in ways that
may have dire economic
and patient care
consequences. For
instance, a hospital drug
shortage often requires
an emergency delivery.
These emergency refills

increase cost and may disrupt a patient's recovery process. In recent years, innovations in information technology have been leveraged to improve supply chain collaboration and move closer to matching supply with demand. In this article, we build on that body of research by examining cloud computing as an enabler of electronic supply chain management systems (e-SCMs) that enhances collaborative information sharing in a multi-echelon hospital supply chain. We use systems theory and system dynamics to develop two conceptual, causal loop diagrams (CLDs); one representing traditional and the other cloud-based information sharing in a hospital supply chain. CLDs and their equivalent system dynamics models are used to simulate the	

performance of traditional and cloud-based hospital supply chains. We compare the performance metrics of both models: average inventory levels, lead time, and unfilled orders. The findings of this study show that cloud-based information sharing improves visibility in healthcare supply chains. As supply chain visibility increases, a hospital's responsiveness improves. Hospitals are now in a better position to accommodate fluctuations in patient demand and supply lead times. As a consequence, hospital supply chains will experience reductions in inventory costs, supply costs, and supply shortages.","author":[{"dropping-particle":"","family":"Gonul Kochan","given":"Cigdem","non-dropping-particle":"","parse-

names":false,"suffix":""},{"dropping-particle":"","family":"Nowicki","given":"David R.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Sauser","given":"Brian","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Randall","given":"Wesley S.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Economics","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"page":"168-185","publisher":"Elsevier B.V.","title":"Impact of cloud-based information sharing on hospital supply chain performance: A system dynamics framework","type":"article-journal","volume":"195"}}

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ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"Bqcy9ARZ","properties":{"formattedCitation":"(M\\uc0\\u252{}ller and Voigt, 2018)","plainCitation":"(Müller and Voigt, 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/7cEQHztU","uris":["http://www.mendeley.com/documents/?uuid=c813351b-6019-47c5-977b-0b4b6ac59574"],"uri":["http://www.mendeley.com/documents/?uuid=c813351b-6019-47c5-977b-0b4b6ac59574"],"itemData":{"DOI":"10.1016/j.ifacol.2018.08.245","ISSN":"24058963","abstra	2018	This paper provides a comprehensive overview of the potentials and challenges of I4.0 in the field of Engineer-to-Order industries. Further. It delineates different perspectives between smaller and larger stakeholders of a SC.	CPS

ct":"By employing Cyber-Physical-Systems and real-time interconnection in industrial value creation, the term Industry 4.0 expresses expectations towards a fourth industrial revolution. Current research in context of Industry 4.0 mainly focuses on production itself or on production-related logistics processes. However, interconnection across the entire supply chain is required to successfully obtain the potentials predicted for Industry 4.0 Still, supply chain management been scarcely investigated by current research in contrast to solutions based on Industry 4.0 in production. Therefore, this paper attempts to address the topic of supply chain management in context of Industry 4.0. We employ a case study

design of a German Engineer-to-Order industrial enterprise and its five logistics partners, which together composes an entire supply chain, finding challenges, potentials and recommendations for Industry 4.0 integration.","author":[{"dropping-particle":"","family":"Müller","given":"Julian M.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Voigt","given":"Kai Ingo","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"IFAC-PapersOnLine","id":"ITEM-1","issue":"11","issued":{"date-parts":[["2018"]]},"page":"122-127","publisher":"Elsevier B.V.","title":"The Impact of Industry 4.0 on Supply Chains in Engineer-to-Order Industries - An

Exploratory Case Study","type":"article-journal","volume":"51"}}], "schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Müller and Voigt, 2018			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"MCsGv9ME","properties":{"formattedCitation":"(Urciuoli and Hintsa, 2017)","plainCitation":"(Urciuoli and Hintsa, 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/Tf6rBoN6","uris":["http://www.mendeley.com/documents/?uuid=7a2fced4-06ff-4f49-8ddf-027bfddcb43f"],"uri":["http://www.mendeley.com/documents/?uuid=7a2fced4-06ff-4f49-8ddf-027bfddcb43f"],"itemData":{"DOI":"10.1080/136755	2017	This paper unveils important security challenges that face SC managers.	Cybersecurity

67.2016.1219703","ISSN":"1469848X","abstract":"The purpose of this paper is to determine the main security threats in supply chains, to understand gaps in today’s supply chain management strategies and to make recommendations to enhance security in the context of supply chain management. Previous research lacks comprehensive studies and recommendations about how supply chain managers deal with security issues in line with the business visions and strategies of their companies. The study methodology is based on an exploratory approach. Data were collected from 20 managers from international companies by means of self-administered surveys, one-to-one interviews and group interviews. Study findings point out risk management as an

important tool at the disposal of managers for trading off performance and vulnerability. However, some important challenges also need to be considered, such as lack of data, insiders, IT vulnerabilities, regulatory frameworks, criminal behaviour, etc. Hence, recommendations are made for managers to improve their understanding of supply chain security. © 2016 Informa UK Limited, trading as Taylor & Francis Group.","author":[{"dropping-particle":"","family":"Urciuoli","given":"Luca","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Hintsa","given":"Juha","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-

title":"International Journal of Logistics Research and Applications","id":"ITEM-1","issue":"3","issued":{"date-parts":[["2017"]]},"page":"276-295","title":"Adapting supply chain management strategies to security???an analysis of existing gaps and recommendations for improvement","type":"article-journal","volume":"20"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Urciuoli and Hintsa, 2017			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"GtRcs0y0","properties":{"formattedCitation":"(Singh et al., 2018)","plainCitation":"(Singh et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/	2018	The paper illustrates the use of the text-mining approach for social media analysis.	Data Mining

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j.tre.2017.05.008","ISSN
":"13665545","abstract":
"This paper proposes a big-data analytics-based approach that considers social media (Twitter) data for the identification of supply chain management issues in food industries. In particular, the proposed approach includes text analysis using a support vector machine (SVM) and hierarchical clustering with multiscale bootstrap resampling. The result of this approach included a cluster of words which could

inform supply-chain (SC) decision makers about customer feedback and issues in the flow/quality of food products. A case study in the beef supply chain was analysed using the proposed approach, where three weeks of data from Twitter were used.","author":[{"dropping-particle":"","family":"Singh","given":"Akshit","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Shukla","given":"Nagesh","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Mishra","given":"Nishikant","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Part E: Logistics and Transportation

Review","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"page":"398-415","publisher":"Elsevier Ltd","title":"Social media data analytics to improve supply chain management in food industries","type":"article-journal","volume":"114"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Singh et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"XvZunAHW","properties":{"formattedCitation":"(Wang and Yue, 2017)","plainCitation":"(Wang and Yue, 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/d3wXK3c0","uris":["http://www.mendeley.com/documents/?uuid=6ba2f22f-a3f9-44c5-a290-	2017	This paper has proposed a new food safety pre-warning system, to analyze safety risks in food SCs. This infrastructural framework supported by IoT technology and association rule mining aims to improve SC quality sustainability.

4629453b29af"],"uri":["http://www.mendeley.com/documents/?uuid=6ba2f22f-a3f9-44c5-a290-4629453b29af"],"itemData":{"DOI":"10.1016/j.foodcont.2016.09.048","ISSN":"09567135","abstract":"In recent years, the food safety incidents happened frequently in china, and then the problems related to food quality and safety have attracted more and more social attention. Considering the concern with regard to quality sustainability in food supply chain, many companies have developed a real time data monitoring system to ensure products quality in the supply chain network. In this paper, we proposed a food safety pre-warning system, adopting association rule mining and Internet of Things technology, to timely monitor all the detection

data of the whole supply chain and automatically pre-warn. The aim of pre-warning system is to help managers in food manufacturing firm to find food safety risk in advance, and to give some decision support information to maintain the quality and safety of food products. A case study of a dairy producer was conducted, and the results showed that the proposed pre-warning system can effectively identify safety risks and accurately determine whether a warning should be issued, depending on the expert analysis when an abnormality is detected by the system. In addition, implications of the proposed approach were discussed, and suggestions for future work were outlined.","author":[{"dropping-particle":"","family":"Wang","given":"Jing","non-

dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Yue","given":"Huili","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Food Control","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"page":"223-229","publisher":"Elsevier Ltd","title":"Food safety pre-warning system based on data mining for a sustainable food supply chain","type":"article-journal","volume":"73"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Wang and Yue, 2017			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"BkRALXO3","properties":{"formattedCitation":"(Tjahjono et al., 2017)","plainCitation":"(	2017	The article analyzes the impact of I4.0 on the SC and discusses how to support companies in better understanding the implications of I4.0 and its relevant technologies towards the achievement of the Digital SC or SC4.0.	IoT

Tjahjono et al., 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/6MXIsM7M","uris":["http://www.mendeley.com/documents/?uuid=c13ef2d8-312b-4b9f-b0c8-55a8ff977d6c"],"uri":["http://www.mendeley.com/documents/?uuid=c13ef2d8-312b-4b9f-b0c8-55a8ff977d6c"],"itemData":{"DOI":"10.1016/j.promfg.2017.09.191","ISBN":"9404601624","ISSN":"23519789","abstract":"The term ‘Industry 4.0’ was coined to mark the fourth industrial revolution, a new paradigm enabled by the introduction of the Internet of Things (IoT) into the production and manufacturing environment. The vision of Industry 4.0 emphasizes the global networks of machines in a smart factory setting

capable of autonomously exchanging information and controlling each other. This cyber-physical system allows the smart factory to operate autonomously. For instance, a machine will know the manufacturing process that needs to be applied to a product, what variation to be made to that product etc., so that the product can be uniquely identifiable as an active entity whose configuration and route in the production line is unique. As the collaboration between suppliers, manufacturers and customers is crucial to increase the transparency of all the steps from when the order is dispatched until the end of the life cycle of the product, it is therefore necessary to analyze the impact of Industry 4.0 on the supply chain as a

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1182","publisher":"Elsev
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to Supply

Chain?","type":"article-journal","volume":"13"}}], "schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Tjahjono et al., 2017		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"rA97Av0u", "properties": {"formattedCitation":"(Chryssolouris et al., 2004)","plainCitation":"(Chryssolouris et al., 2004)","dontUpdate":true,"noteIndex":0},"citationItems": [{"id":"fJ2LYHh2/7WlDDmy5","uris":["http://www.mendeley.com/documents/?uuid=44d54e88-74c4-4a2f-8707-1beeb35ba031"],"uri": ["http://www.mendeley.com/documents/?uuid=44d54e88-74c4-4a2f-8707-1beeb35ba031"],"itemData": {"DOI":"10.1080/095119	2004	This work demonstrates that the use of XML for the communication implementation in the SC offers advantages due to its simplicity and openness. This paper discusses the implementation of such a mechanism, which enables the communication of heterogeneous systems, by adapting a neutral data format.

2031000080885","ISSN":"0951192X","abstract":"A current trend of companies in the manufacturing industry is to operate\\nglobally in order to expand the limits of their business and integrate\\ntheir operations with these of their business partners. The growth of\\nthe Internet and the software technologies that arise from it provides\\nthe means for this globalization. In this paper, we examine the problems\\narising from the integration of partners, who use heterogeneous\\ninformation systems. The paper deals particularly with the ship repair\\nindustry as a case study of these problems and their solution. In this\\nwork, we demonstrate how modern information technology can support the\\ncommunication of different partners and enable the information

flow\\nwithin the value added chain. Moreover, we describe how the performance\\nof a supply chain can be improved by applying a generic hierarchical\\nmodel though the appropriate planning of the critical manufacturing\\noperations.","author":[{"dropping-particle":"","family":"Chryssolouris","given":"G.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Makris","given":"S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Xanthakis","given":"V.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Mourtzis","given":"D.","non-dropping-particle":"","parse-

names":false,"suffix":""}],"container-title":"International Journal of Computer Integrated Manufacturing","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2004"]]},"page":"45-57","title":"Towards the internet-based supply chain management for the ship repair industry","type":"article-journal","volume":"17"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Chryssoloouris et al., 2004

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"cO1zTv8E","properties":{"formattedCitation":"(Ben-Daya et al., 2017)","plainCitation":"(Ben-Daya et al., 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/QTERflXy","uris":["http://

2017 This paper explores the role of IoT and its impact on SCM through an extensive literature review. It provides an informative overview of the latest development in this emerging and growing area.

www.mendeley.com/documents/?uuid=e728e9da-f2ff-40cf-ba1a-af933561f7a7"],"uri":["http://www.mendeley.com/documents/?uuid=e728e9da-f2ff-40cf-ba1a-af933561f7a7"],"itemData":{"DOI":"10.1080/00207543.2017.1402140","ISBN":"00207543 (ISSN)","ISSN":"1366588X","abstract":"This paper explores the role of Internet of Things (IoT) and its impact on supply chain management (SCM) through an extensive literature review. Important aspects of IoT in SCM are covered including IoT definition, main IoT technology enablers and various SCM processes and applications. We offer several categorisation of the extant literature, such as based on methodology, industry

sector and focus on a classification based on major supply chain processes. In addition, a bibliometric analysis of the literature is also presented. We find that most studies have focused on conceptualising the impact of IoT with limited analytical models and empirical studies. In addition, most studies have focused on the deliv-ery supply chain process and the food and manufacturing supply chains. Areas of future SCM research that can support IoT implementation are also identified.","author":[{"dropping-particle":"","family":"Ben-Daya","given":"Mohamed","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Hassini","given":"Elkafi","non-dropping-particle":"","parse-

names":false,"suffix":""},{"dropping-particle":"","family":"Bahroun","given":"Zied","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Research","id":"ITEM-1","issue":"November","issued":{"date-parts":[["2017"]]},"page":"1-24","publisher":"Taylor & Francis","title":"Internet of things and supply chain management: a literature review","type":"article-journal","volume":"7543"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Ben-Daya et al., 2017

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"EpD33O6i","properties":{"formattedCitation":"(Le e et al., 2017)","plainCitation":"(

2017 This paper proposes an IoT-based warehouse management system with an advanced data analytical approach using computational intelligence techniques to enable smart logistics for I4.0.

Lee et al., 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/PUrpcadn","uris":["http://www.mendeley.com/documents/?uuid=c9a4c32c-888d-4a64-91f4-badeeefce3d1"],"uri":["http://www.mendeley.com/documents/?uuid=c9a4c32c-888d-4a64-91f4-badeeefce3d1"],"itemData":{"DOI":"10.1080/00207543.2017.1394592","ISBN":"0092-5853","ISSN":"1366588X","abstract":"Warehouse operations need to change due to the increasing complexity and variety of customer orders. The demand for real-time data and contextual information is requried because of the highly customised orders, which tend to be of small batch size but with high variety. Since the orders frequently

change according to customer requirements, the synchronisation of purchase orders to support production to ensure on-time order fulfilment is of high importance. However, the inefficient and inaccurate order picking process has adverse effects on the order fulfilment. The objective of this paper is to propose an Internet of things (IoT)-based warehouse management system with an advanced data analytical approach using computational intelligence techniques to enable smart logistics for Industry 4.0. Based on the data collected from a case company, the proposed IoT-based WMS shows that the warehouse productivity, picking accuracy and efficiency can be improved and it is robust to order variability.","author": [{"dropping-

particle":"","family":"Lee","given":"C. K.M.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lv","given":"Yaqiong","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ng","given":"K. K.H.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ho","given":"William","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Choy","given":"K. L.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Research","id":"ITEM-1","issue":"October","issued":{"date-parts":

[["2017"]]},"page":"1-16","title":"Design and application of Internet of things-based warehouse management system for smart logistics","type":"article-journal","volume":"7543"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Lee et al., 2017

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"K9bzthCi","properties":{"formattedCitation":"(Rodriguez Molano et al., 2017)","plainCitation":"(Rodriguez Molano et al., 2017)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/FPKLXyuM","uris":["http://www.mendeley.com/documents/?uuid=918d06a6-4e74-4922-bf0c-eb6367307ee3"],"uri":["http://www.mendeley.com/

2017 This article presents proposal architecture for the SC in the I4.0 context, which can be used by each member of SC to optimize the processes in real-time, besides evaluating the architecture through a mobile application.

documents/?uuid=918d06a6-4e74-4922-bf0c-eb6367307ee3"],"itemData":{"DOI":"10.12988/ces.2017.711186","abstract":"The following research exposes different tools that bring guidelines to the supply chain to be included in the industry 4.0 and get competitive advantages, showing an architecture proposal that can be adopted by the supply chains immersed in this kind of industry. The methodology used was: first, the revision of the research literature, making an exhaustive and methodical analysis of the proposals, advances, methodologies, future investigations, results and conclusions obtained. As second, the architecture is proposed, explaining one by one the elements of it. And finally, a mobile application is created in

order to validate the proposed architecture. As a result, a validation of the architecture was obtained through a mathematical model that measures the usability of it, in this way, the connection between the sensor layer and the application layer is validated.","author":[{"dropping-particle":"","family":"Rodriguez Molano","given":"Jose Ignacio","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Contreras Bravo","given":"Leonardo Emiro","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Trujillo","given":"Edwin Rivas","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Contemporary Engineering

Sciences","id":"ITEM-1","issue":"32","issued":{"date-parts":[["2017"]]},"page":"1581-1594","title":"Supply chain architecture model based in the industry 4.0, validated through a mobile application","type":"article-journal","volume":"10"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Rodriguez Molano et al., 2017

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"ZWOM2Tts","properties":{"formattedCitation":"(Tsang et al., 2018)","plainCitation":"(Tsang et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/jnLIoLiT","uris":["http://www.mendeley.com/documents/?uuid=466071c7-234e-4613-ba84-

2018 The authors propose an IoT Risk Management System to contribute to the area of risk monitoring by IOT application and AI techniques.

61bed09905cb"],"uri":["http://www.mendeley.com/documents/?uuid=466071c7-234e-4613-ba84-61bed09905cb"],"itemData":{"DOI":"10.1108/IMDS-09-2017-0384","ISSN":"02635577","abstract":"Purpose Since the handling of environmentally sensitive products requires close monitoring under prescribed conditions throughout the supply chain, it is essential to manage specific supply chain risks, i.e. maintaining good environmental conditions, and ensuring occupational safety in the cold environment. The purpose of this paper is to propose an Internet of Things (IoT)-based risk monitoring system (IoTRMS) for controlling product quality and occupational safety risks in cold chains. Real-time

product monitoring and risk assessment in personal occupational safety can be then effectively established throughout the entire cold chain. Design/methodology/approach In the design of IoTRMS, there are three major components for risk monitoring in cold chains, namely: wireless sensor network; cloud database services; and fuzzy logic approach. The wireless sensor network is deployed to collect ambient environmental conditions automatically, and the collected information is then managed and applied to a product quality degradation model in the cloud database. The fuzzy logic approach is applied in evaluating the cold-associated occupational safety risk of the different cold chain parties considering specific personal health status.

To examine the performance of the proposed system, a cold chain service provider is selected for conducting a comparative analysis before and after applying the IoTRMS. Findings The real-time environmental monitoring ensures that the products handled within the desired conditions, namely temperature, humidity and lighting intensity so that any violation of the handling requirements is visible among all cold chain parties. In addition, for cold warehouses and rooms in different cold chain facilities, the personal occupational safety risk assessment is established by considering the surrounding environment and the operators? personal health status. The frequency of occupational safety risks occurring, including

cold-related accidents and injuries, can be greatly reduced. In addition, worker satisfaction and operational efficiency are improved. Therefore, it provides a solid foundation for assessing and identifying product quality and occupational safety risks in cold chain activities. Originality/value The cold chain is developed for managing environmentally sensitive products in the right conditions. Most studies found that the risks in cold chain are related to the fluctuation of environmental conditions, resulting in poor product q…","author":[{"dropping-particle":"","family":"Tsang","given":"Y. P.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Cho

y","given":"K. L.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wu","given":"C. H.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ho","given":"G. T.S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lam","given":"Cathy H.Y.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Koo","given":"P. S.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Industrial Management and Data Systems","id":"ITEM-1","issue":"7","issued":{"date-parts":[["2018"]]},"page":"1432-

1462","title":"An Internet of Things (IoT)-based risk monitoring system for managing cold supply chain risks","type":"article-journal","volume":"118"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Tsang et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"B8Bz51Cm","properties":{"formattedCitation":"(Kamble et al., 2019)","plainCitation":"(Kamble et al., 2019)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/aOEUSMyC","uris":["http://www.mendeley.com/documents/?uuid=66b7c625-36ec-4388-b7ad-ee5bfe67ef6d"],"uri":["http://www.mendeley.com/documents/?](#)	2019	This study identifies the various barriers affecting the adoption of IoT in the retail SC in the Indian context and also investigates the inter-dependences between the factors using ISM and DEMATEL methodology.

uuid=66b7c625-36ec-4388-b7ad-ee5bfe67ef6d"],"itemData":{"DOI":"10.1016/j.jretconser.2019.02.020","ISSN":"09696989","abstract":"Internet of things (IoT) is estimated to play a significant role in offering tangible and commercial benefits to the supply chains making the operational processes more efficient and productive. IoT system provides the decision-makers with new insights on the value proposition, value creation, helping them to strengthen their bond with the customers and adopt a more effective policy and practices. The food retailing scenario is becoming more complex and flexible putting pressure on the retailing firms to re-design their marketing strategies incorporating the changing consumer behavior. The IoT is expected to help the

retailers in controlling the quality of food products, plan waste management of the items that have exceeded their shelf life, manage the temperature at the store, freezers and other equipment's contributing to the reduction of energy consumption. Despite the vast potential of IoT in food retail supply chains, the adoption of IoT is still in its nascent stage. Therefore, this study attempts to identify the various barriers that affect the adoption of IoT in the retail supply chain in the Indian context and also investigates the inter-dependences between the factors using a two-stage integrated ISM and DEMATEL methodology. Lack of government regulations and poor internet infrastructure were identified to be the significant drivers for IoT

adoption.","author":[{"dropping-particle":"","family":"Kamble","given":"Sachin S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Gunasekaran","given":"Angappa","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Parekh","given":"Harsh","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Joshi","given":"Sudhanshu","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Retailing and Consumer Services","id":"ITEM-1","issue":"January","issued":{"date-parts":[["2019"]]},"page":"154-168","publisher":"Elsevier Ltd","title":"Modeling the internet of things

adoption barriers in food retail supply chains","type":"article-journal","volume":"48"}}], "schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Kamble et al., 2019

ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"U8PNpq98","properties":{"formattedCitation":"(Birkel and Hartmann, 2019)","plainCitation":"(Birkel and Hartmann, 2019)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/IDFEW7OG","uris":["http://www.mendeley.com/documents/?uuid=134743ed-0488-4533-b7e8-87ae214e28e2"],"uri":["http://www.mendeley.com/documents/?uuid=134743ed-0488-4533-b7e8-87ae214e28e2"],"itemD

2019

This study provides a comprehensive view of the challenges and risks of IoT in the field of SCM by conducting a SLR. A framework and classification of the key content is developed to synthesize the fragmented body of literature.

ata":{"DOI":"10.1108/SCM-03-2018-0142","ISSN":"13598546","abstract":"Purpose The purpose of this paper is to offer a comprehensive overview of challenges and risks of the Internet of Things (IoT) in supply chain management (SCM) and provide a structured framework for classifying and analyzing the relevant literature to deduce insights for research and practice. Design/methodology/approach A systematic literature review (SLR) of 102 peer-reviewed journal articles on the topic of IoT in SCM was conducted. Findings This review identifies, categorizes and describes the relevant literature regarding the dimensions time and specificity. The resulting framework contains a holistic overview including focus areas and relations of macro-

environmental, network-related and organizational challenges and risks. Furthermore, this review represents a conceptual framework for future research, considering the multidisciplinary body of the subject and provides an analysis of the timeline of literature, journals and used methodologies. Practical implications This study offers valuable insight...","author":[{"dropping-particle":"","family":"Birkel","given":"Hendrik Sebastian","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Hartmann","given":"Evi","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-1","issue":"1","issued":

{"date-parts":[["2019"]]},"page":"39-61","title":"Impact of IoT challenges and risks for SCM","type":"article-journal","volume":"24"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Birkel and Hartmann, 2019		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"JjRCSMIu","properties":{"formattedCitation":"(Tu et al., 2016)","plainCitation":"(Tu et al., 2016)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/3QTKs655","uris":["http://www.mendeley.com/documents/?uuid=5846f0fd-331f-453f-978b-645959aa9cb1"],"uri":["http://www.mendeley.com/documents/?uuid=5846f0fd-331f-	2016	The IoT modelling framework developed in this study is the first in this field which decomposes IoT system design into ontology-, process-, and object-modelling layers. Novel implementation architecture also proposed to transform IoT system design models to implementation logic.

453f-978b-645959aa9cb1"],"itemData":{"DOI":"10.1108/IMDS-11-2016-0503","abstract":"If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information. About Emerald www.emeraldinsight.com Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation. Abstract Purpose – The lack of reference architecture for IoT modeling impedes the successful design and implementation of an IoT-based production logistics and supply chain system (PLSCS). We present this study in two parts to address this research issue. Part A proposes a unified IoT modeling framework to model the dynamics of distributed IoT processes, IoT devices, and IoT objects. The models of the framework can be leveraged to support the implementation architecture of an IoT-

based PLSCS. Second part of this study extents the implementation architecture proposed in Part A. Part B presents an IoT-based Cyber-Physical System (CPS) framework and evaluates its performance. Design/methodology/approach – This paper adopts a design research approach, using ontology, process analysis, and Petri net (PN) modeling scheme to support IoT system modeling. Findings – The proposed IoT system modeling approach reduces the complexity of system development and increases system portability for IoT-based PLSCS. The IoT design models generated from the modeling can also be transformed to implementation logic. Practical implications – The proposed IoT system modeling framework and the

implementation architecture can be used to develop an IoT-based PLSCS in the real industrial setting. The proposed modeling methods can be applied to many discrete manufacturing industries. Originality/value – The IoT modeling framework developed in this study is the first in this field which decomposes IoT system design into ontology-, process-, and object-modeling layers. A novel implementation architecture also proposed to transform above IoT system design …","author":[{"dropping-particle":"","family":"Tu","given":"Mengru","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lim","given":"Ming","non-dropping-particle":"","parse-names":false,"suffix":""},

{"dropping-particle":"","family":"Yang","given":"Ming-Fang","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Industrial Management & Data Systems","id":"ITEM-1","issued":{"date-parts":[["2016"]]},"title":"Industrial Management & Data Systems Internet of Things-based production logistics and supply chain system-Part 1: Modeling IoT-based manufacturing supply chain \"Internet of Things-based production logistics and supply chain system-Part 1: Modeling IoT-ba","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Tu et al., 2016			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"xZ5n2MAs	2018	This article adopts the four design principles of I4.0 originally developed in manufacturing and considering the same principles on an SC scenario using a MAS approach.	MAS

","properties":{"formattedCitation":"(Ghadimi et al., 2018)","plainCitation":"(Ghadimi et al., 2018)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/wPq4p6aM","uris":["http://www.mendeley.com/documents/?uuid=d98c36dc-a029-460d-a4ce-e87a047d764f"],"uri":["http://www.mendeley.com/documents/?uuid=d98c36dc-a029-460d-a4ce-e87a047d764f"],"itemData":{"DOI":"10.1016/j.cie.2018.10.050","ISBN":"03608352 (ISSN)","ISSN":"03608352","abstract":"Advancements in information and communication systems offer immense opportunities for supply chain intelligence and autonomy establishing stepping stones for Industry 4.0 supply chains (SCs). As a

					crucial SC decision, sustainable supplier evaluation and selection process have been addressed abundantly in the previous literature. However, this process has not yet been realized within Industry 4.0 SCs where interconnection, real-time information transparency, technical assistance and decentralization of members of a physical system (i.e., supply chain members) are regarded as the main design principles. To narrow the identified gap, a Multi-Agent Systems (MASs) approach is proposed for addressing sustainable supplier evaluation and selection process to provide a proper communication channel, structured information exchange and visibility among suppliers and manufacturers. Furthermore, the

application of MASs in this process and their natural applicability as one of the enabling technologies in moving towards Industry 4.0 SCs are investigated in detail. It is found that the proposed approach can help decision-makers inside manufacturing firms to make prompt decisions with less human interactions. The merit of the developed MAS is demonstrated through a real-world implementation on a medical device manufacturer. Finally, the limitations and advantages of the proposed approach are presented together with some remarks for future work.","author":[{"dropping-particle":"","family":"Ghadimi","given":"Pezhman","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Chao","non-

dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lim","given":"Ming K.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Heavey","given":"Cathal","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Computers and Industrial Engineering","id":"ITEM-1","issue":"April 2018","issued":{"date-parts":[["2018"]]},"page":"588-600","publisher":"Elsevier","title":"Intelligent sustainable supplier selection using multi-agent technology: Theory and application for Industry 4.0 supply chains","type":"article-journal","volume":"127"}}],"schema":"https://github.com/citation-style-language/schema/

raw/master/csl-citation.json"}Ghadimi et al., 2018		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"8SX5Ja30","properties":{"formattedCitation":"(Raisinghani and Meade, 2005)","plainCitation":"(Raisinghani and Meade, 2005)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/APMX9K53","uris":["http://www.mendeley.com/documents/?uuid=f6582a79-dd5b-4132-8a25-26d659fc059c"],"uri":["http://www.mendeley.com/documents/?uuid=f6582a79-dd5b-4132-8a25-26d659fc059c"],"itemData":{"DOI":"10.1108/13598540510589188","ISBN":"1359854051058","ISSN":"13598546","abstract":"Purpose - To investigate the linkage between	2005	This paper provides a decision model that assists in determining which construct of KM is most important based on an organization's performance criteria, dimensions of agility and supply-chain drivers.

organization performance criteria and the dimensions of agility, e-supply-chain drivers and knowledge management. Design/methodology/approach - The analytic network process is applied as the research methodology in the context of executive decisions that include qualitative and quantitative attributes. The decision model is presented, along with a case study with an e-supply chain of a global telecommunications company. Findings - The study develops a framework for measuring the relative importance of a particular dimension based on the application of theoretical concepts from the information systems and management science literature to the digital, knowledge economy. Since contextual factors play a critical role in the	

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need and offers practical help in a dynamic and competitive environment by providing a decision model that assists in determining which construct of KM is most important based on an organization's performance criteria, dimensions of agility and supply-chain drivers. © Emerald Group Publishing Limited.","author":[{"dropping-particle":"","family":"Raisinghani","given":"Mahesh S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Meade","given":"Laura L.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-1","issue":"2","issued":{"date-parts":[["2005"]]},"page":"114-

121","title":"Strategic decisions in supply-chain intelligence using knowledge management: An analytic-network-process framework","type":"article-journal","volume":"10"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Raisinghani and Meade, 2005			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"Hdw2XBQy","properties":{"formattedCitation":"(Zhu et al., 2019)","plainCitation":"(Zhu et al., 2019)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/Kl22vRl6","uris":["http://www.mendeley.com/documents/?uuid=6b5ba8f6-6709-44ed-a356-298aa1f2ec24"],"uri":["http://	2019	The study discusses the ML approaches used to refine the performance in forecasting enterprises' credit risk in traditional finance channels.	ML

www.mendeley.com/documents/?uuid=6b5ba8f6-6709-44ed-a356-298aa1f2ec24"],"itemData":{"DOI":"10.1016/j.ijpe.2019.01.032","ISSN":"09255273","abstract":"In recent years, financial institutions (FIs) have tentatively utilized supply chain finance (SCF) as a means of solving the financing issues of small and medium-sized enterprises (SMEs). Thus, forecasting SMEs' credit risk in SCF has become one of the most critical issues in financing decision-making. Nevertheless, traditional credit risk forecasting models cannot meet the needs of such forecasting. Many researchers argue that machine learning (ML) approaches are good tools. Here we propose an enhanced hybrid ensemble ML approach called RS-MultiBoosting by

					incorporating two classic ensemble ML approaches, random subspace (RS) and MultiBoosting, to improve the accuracy of forecasting SMEs' credit risk. The experimental samples, originating from data on forty-six quoted SMEs and seven quoted core enterprises (CEs) in the Chinese securities market between 31 March 2014 and 31 December 2015, are collected to test the feasibility and effectiveness of the RS-MultiBoosting approach. The forecasting result shows that RS-MultiBoosting has good performance in dealing with a small sample size. From the SCF perspective, the results suggest that to enhance SMEs' financing ability, 'traditional' factors, such as the current and quick ratio of SMEs, remain critical. Other SCF-specific factors, for instance, the features of

trade goods and the CE's profit margin, play a significant role.","author":[{"dropping-particle":"","family":"Zhu","given":"You","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zhou","given":"Li","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Xie","given":"Chi","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Gang Jin","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"V.","family":"Nguyen","given":"Truong","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-

title":"International Journal of Production Economics","id":"ITEM-1","issued":{"date-parts":[["2019"]]},"page":"22-33","publisher":"Elsevier B.V.","title":"Forecasting SMEs' credit risk in supply chain finance with an enhanced hybrid ensemble machine learning approach","type":"article-journal","volume":"211"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Zhu et al., 2019		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"YcENnxyo","properties":{"formattedCitation":"(De Clercq et al., 2019)","plainCitation":"(De Clercq et al., 2019)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/dMqJC1Gk","uris":["http://	2019	The study presents a design of graphical user interface to ML models capable of predicting biogas output given a set of waste inputs. The aim of the study is to enhance biogas production in industrial facilities.

www.mendeley.com/documents/?uuid=c46760dd-f436-4cb6-82ee-0aadb5edf02c"],"uri":["http://www.mendeley.com/documents/?uuid=c46760dd-f436-4cb6-82ee-0aadb5edf02c"],"itemData":{"DOI":"10.1016/j.jclepro.2019.01.031","ISSN":"09596526","abstract":"The search for appropriate models for predictive analytics is currently a high priority to optimize anaerobic fermentation processes in industrial-scale biogas facilities; operational productivity could be enhanced if project operators used the latest tools in machine learning to inform decision-making. The objective of this study is to enhance biogas production in industrial facilities by designing a graphical user interface to machine learning

models capable of predicting biogas output given a set of waste inputs. The methodology involved applying predictive algorithms to daily production data from two major Chinese biogas facilities in order to understand the most important inputs affecting biogas production. The machine learning models used included logistic regression, support vector machine, random forest, extreme gradient boosting, and k-nearest neighbors regression. The models were tuned and cross-validated for optimal accuracy. Our results showed that: (1) the KNN model had the highest model accuracy for the Hainan biogas facility, with an 87% accuracy on the test set; (2) municipal fecal residue, kitchen food waste, percolate, and chicken litter were

inputs that maximized biogas production; (3) an online web-tool based on the machine learning models was developed to enhance the analytical capabilities of biogas project operators; (4) an online waste resource mapping tool was also developed for macro-level project location planning. This research has wide implications for biogas project operators seeking to enhance facility performance by incorporating machine learning into the analytical pipeline.","author":[{"dropping-particle":"","family":"Clercq","given":"Djavan","non-dropping-particle":"De","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Jalota","given":"Devansh","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-

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ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"mz6LQ6VF","properties":{"formattedCitation":"(Carbonneau et al., 2008)","plainCitation":"(

2008 The paper reviews the background and related work for demand forecasting in the extended SC. It also describes and compares the results of the experiments with different forecasting methods.

Carbonneau et al., 2008)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/f7gRbsV4","uris":["http://www.mendeley.com/documents/?uuid=3a54a555-52a5-4b24-8617-8f411a479f88"],"uri":["http://www.mendeley.com/documents/?uuid=3a54a555-52a5-4b24-8617-8f411a479f88"],"itemData":{"DOI":"10.1016/j.ejor.2006.12.004","ISSN":"03772217","abstract":"Full collaboration in supply chains is an ideal that the participant firms should try to achieve. However, a number of factors hamper real progress in this direction. Therefore, there is a need for forecasting demand by the participants in the absence of full information about other participants' demand. In this paper we investigate the

applicability of advanced machine learning techniques, including neural networks, recurrent neural networks, and support vector machines, to forecasting distorted demand at the end of a supply chain (bullwhip effect). We compare these methods with other, more traditional ones, including naïve forecasting, trend, moving average, and linear regression. We use two data sets for our experiments: one obtained from the simulated supply chain, and another one from actual Canadian Foundries orders. Our findings suggest that while recurrent neural networks and support vector machines show the best performance, their forecasting accuracy was not statistically significantly better than that of the regression model.

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1","issue":"3","issued":
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[["2008"]]},"page":"1140-
1154","title":"Application
of machine learning
techniques for supply
chain demand
forecasting","type":"articl
e-
journal","volume":"184"}}
],"schema":"https://

github.com/citation-style-language/schema/raw/master/csl-citation.json"}Carbonneau et al., 2008		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"OJrxx8TB","properties":{"formattedCitation":"(Piramuthu, 2005)","plainCitation":"(Piramuthu, 2005)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/F4lfIzqt","uris":["http://www.mendeley.com/documents/?uuid=f3d20b0f-1722-4c84-97b8-a4804bc33c32"],"uri":["http://www.mendeley.com/documents/?uuid=f3d20b0f-1722-4c84-97b8-a4804bc33c32"],"itemData":{"DOI":"10.1016/j.eswa.2005.07.004","ISSN":"09574174","abstract":"Recent trend in eCommerce applications toward	2005	The authors developed a framework for possible application of knowledge discovery methods in automated SC configuration.

effectively reducing supply chain costs - including spatial, temporal, and monetary resources - has spurred interest among researchers as well as practitioners to efficiently utilize supply chains. One of the least studied of these views is adaptive or dynamic configuration of supply chains. This problem is relatively new since faster communications over the Internet or by any other means and the willingness to utilize it for effective management of supply chains did not exist a few decades ago. The proposed framework addresses the problem of supply chain configuration. We incorporate machine-learning techniques to develop a dynamically configurable supply chain framework, and evaluate its effectiveness with respect to comparable	

static supply chains. Specifically, we consider the case where several parts go into the production of a product. A single supplier or a combination of suppliers could supply these parts. The proposed framework automatically forms the supply chain dynamically as per the dictates of incoming orders and the constraints from suppliers upstream. © 2005 Elsevier Ltd. All rights reserved.","author":[{"dropping-particle":"","family":"Piramuthu","given":"Selwyn","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Expert Systems with Applications","id":"ITEM-1","issue":"4","issued":{"date-parts":[["2005"]]},"page":"985-990","title":"Machine learning for dynamic multi-product supply chain

formation","type":"article-journal","volume":"29"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Piramuthu, 2005			
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"Vpc3kHn1","properties":{"formattedCitation":"(Lorite et al., 2017b)","plainCitation":"(Lorite et al., 2017b)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/bhiiS7Vh","uris":["http://www.mendeley.com/documents/?uuid=9e8f1b84-7ee9-4d36-9825-8c99048d0c9c"],"uri":["http://www.mendeley.com/documents/?uuid=9e8f1b84-7ee9-4d36-9825-8c99048d0c9c"],"itemData":{"DOI":"10.1016/	2017	The research presents the design and development of an integrated CTI-RFID in order to monitor the SC of fresh-cut fruits within a critical temperature range.	RFID

j.jfoodeng.2016.06.016",
"ISBN":"0260-
8774","ISSN":"0260877
4","abstract":"In order to
reduce food waste and
meet the needs of the
demanding modern
consumer regarding the
quality of food items, it
is crucial to monitor the
supply chain and
storage conditions of
perishable food
products. Considering
this scenario,
temperature plays an
important role on food
safety and quality during
storage and supply. In
this work, a critical
temperature indicator
(CTI) based on a
solvent melting point is
developed.
Furthermore, the
present CTI working
principle is improved by
the use of microfluidics
technology. As final
result, a novel and
functional CTI-smart
sensor which combines
irreversible visual color
changes and radio
frequency identification

(RFID) technologies is achieved. Such CTI integrated to a RFID tag provides a unique advantage to monitor the supply chain in real time by the simple use of a RFID reader in strategic points.","author":[{"dropping-particle":"","family":"Lorite","given":"Gabriela Simone","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Selkälä","given":"Tuula","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Sipola","given":"Teemu","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Palenzuela","given":"Jesús","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-

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citation.json"}Lorite et al., 2017b		
ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"OdJmwQP9","properties":{"formattedCitation":"(Attaran, 2007)","plainCitation":"(Attaran, 2007)","dontUpdate":true,"noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/5gQ3aHIx","uris":["http://www.mendeley.com/documents/?uuid=9f9fa1aa-f8a8-4a3f-93ff-5232e12ff7cc"],"uri":["http://www.mendeley.com/documents/?uuid=9f9fa1aa-f8a8-4a3f-93ff-5232e12ff7cc"],"itemData":{"DOI":"10.1108/13598540710759763","ISBN":"1359-8546","ISSN":"13598546","abstract":"Purpose – The desire to cut supply chain costs has made	2007	The paper presents the RFID implementation challenges, adoption phases, and success factors. It also discusses the challenges of how to integrate RFID with existing SCM, customer relationship management, and ERP applications.

RFID technology one of today ' s most discussed retail technologies . Given the current implementation pace , the objective of this paper is to go beyond the hype and explore basic issues related to RFID technology , including its promises as well as its pitfalls . Design / methodology / approach – The author provides a conceptual discussion of the evolution of RFID , addresses its capabilities and its application in various industries , discusses implementation challenges , identifies adoption phases , and reviews RFID ' s success factors . Findings – RFID is the most recent prolific technology that provides supply chain collaboration and visibility . An RFID systems solution will increase corporate ROI while at the same time	

improving retail supply chain communication . Handled properly , RFID technology can result in an evolutionary change incorporating legacy systems with the real - time supply chain management of tomorrow . Its stumbling point seems only to be a variety of issues outside the technology itself : marketing problems , false promises , security and privacy considerations , and a lack of standards . Research limitations / implications – The paper was constrained by empirical evidence of , for example , technology deployment , adoption drivers , and success factors . Practical implications – The paper confirms the power of RFID – a technology in its infancy with as yet untapped potential for supply chain collaboration . It also examines some of the popular RFID products	

and services . Originality / value – The paper discusses implementation challenges , identifies adoption phases , and reviews RFID ' s success factors . It identifies the biggest implementation challenge as the challenge for IT experts of determining how to integrate RFID with existing supply chain management (SCM) , customer relationship management (CRM) , and enterprise resource planning (ERP) applications .","author":[{"dropping-particle":"","family":"Attaran","given":"Mohsen","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-1","issue":"4","issued":{"date-parts":[["2007"]]},"page":"249-257","title":"RFID: An

enabler of supply chain operations","type":"article-journal","volume":"12"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}Attaran, 2007

1

2**Appendix II**

3Table AII, 1. Technologies, definition

Technologies	Definition	References
BD	Description of any large amount of structured or unstructured data having a potential to be mined for information.	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"NlogR31c","properties":{"formattedCitation":"(Merlino and Sproge, 2017)","plainCitation":"(Merlino and Sproge, 2017)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/lHvnLCgM","uris":["http://www.mendeley.com/documents/?uuid=e726e3ac-b861-48aa-9c25-de4b4e3ba1d4"],"uri":["http://www.mendeley.com/documents/?uuid=e726e3ac-b861-48aa-9c25-de4b4e3ba1d4"],"itemData":{"DOI":"10.1016/

j.proeng.2017.01.053","ISSN":"18777058","abstract":"Supply Chain processes must augment and change with massive injection of new technologies, robotics, artificial intelligence, big data approach, and contemporarily become more sustainable, considering the growing environmental challenges. This paper explores the main technological changes and the most advanced cases in sustainable Supply Chain. From Materials Handling to Production and Distribution, big data and robotics will change conditions and push further efficiency and customer service levels. After a general overview of the present and

future trends in these areas, some practical case and experiences will be quoted.","author":[{"dropping-particle":"","family":"Merlino","given":"Massimo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Sproge","given":"Ilze","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Procedia Engineering","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"note":"11+23","page":"308-318","title":"The Augmented Supply Chain","type":"article-journal","volume":"178"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-

		citation.json"} (Merlino and Sproge, 2017)
IoT	A dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual ‘Things” have identities, physical attributes, virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network.	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"MdGgifjb","properties":{"formattedCitation":"(Dossou, 2018b)","plainCitation":"(Dossou, 2018b)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/0CqsljbJ","uris":["http://www.mendeley.com/documents/?uuid=2ed1863a-ad69-4728-9dcf-80cdea6bca50"],"uri":["http://www.mendeley.com/documents/?uuid=2ed1863a-ad69-4728-9dcf-80cdea6bca50"],"itemData":{"DOI":"10.1016/j.promfg.2018.10.069","ISSN":"23519789","abstract":"Globalization is now acted everywhere in the

world as an important and economic reason for company improvement. It is clear that company supply chain could be optimized for insuring customer satisfaction. Due to low cost of labor force in emerging countries, companies in developed countries have to reorganizing themselves for being competitive. Industry 4.0 and supply chain 4.0 are the results of this crucial desire of better performance. A company has to integrate new technological concepts and digitalization on its supply chain in order to reduce cost and increase product quality. Despite the great and positive impact on large companies,

these concepts are not already integrated into small and medium enterprises (SMEs). They considered industry 4.0 and supply chain 4.0 concepts as a dream, thus they are not ready to use them for increasing their performance. The use of complex system modelling and multi-criteria analysis allow to define an adapted framework specially destined to SMEs improvement according to supply 4.0 concepts. In addition to technological and digital parameters, social, societal and environmental dimensions are integrated in this vision. Sustainability is considered as important for supply chain performance. The idea is to

measure the dynamic of supply chain 4.0 and Industry 4.0 concepts implementation in SMEs, to find brakes and to define action plan for accelerating this dynamic. This paper focuses on this approach destined to SMEs. A reference model is being developed for metallurgic SMEs by using Case Based Reasoning (CBR) and generalization reasoning. Then, a real case is shown for illustrating the approach. Perspectives are exposed for according to the development of a software collaborative, co-creative and co-innovative tool for adapting SME performance

according to supply chain 4.0 concepts and taking into account sustainability.","author":[{"dropping-particle":"","family":"Dossou","given":"Paul Eric","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Procedia Manufacturing","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"note":"2","page":"452-459","publisher":"Elsevier B.V.","title":"Impact of Sustainability on the supply chain 4.0 performance","type":"article-journal","volume":"17"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}
(Dossou, 2018b)

CC	“CC is a powerful technology to perform massive-scale and complex computing. It eliminates the need to maintain expensive computing hardware, dedicated space, and software.”	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"wwfRJpkV","properties":{"formattedCitation":"(Abaker et al., 2014)","plainCitation":"(Abaker et al., 2014)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/VAt9e9UT","uris":["http://www.mendeley.com/documents/?uuid=33054145-46c7-3e32-8a98-77e2c0c7a998"],"uri":["http://www.mendeley.com/documents/?uuid=33054145-46c7-3e32-8a98-77e2c0c7a998"],"itemData":{"DOI":"10.1016/j.is.2014.07.006","abstract":"Cloud computing is a powerful technology to perform massive-scale and complex computing. It eliminates the need

to maintain expensive computing hardware, dedicated space, and software. Massive growth in the scale of data or big data generated through cloud computing has been observed. Addressing big data is a challenging and time-demanding task that requires a large computational infrastructure to ensure successful data processing and analysis. The rise of big data in cloud computing is reviewed in this study. The definition, characteristics, and classification of big data along with some discussions on cloud computing are introduced. The relationship between big data and cloud computing, big data

storage systems, and Hadoop technology are also discussed. Furthermore, research challenges are investigated, with focus on scalability, availability, data integrity, data transformation, data quality, data heterogeneity, privacy, legal and regulatory issues, and governance. Lastly, open research issues that require substantial research efforts are summarized.","auth or":[{"dropping-particle":"","family":" Abaker","given":"Ibr ahim","non-dropping-particle":"","parse-names":false,"suffix" :""},{"dropping-particle":"","family":" Hashem","given":"T argio","non-dropping-particle":"","parse-

names":false,"suffix":""},{"dropping-particle":"","family":"Yaqoob","given":"Ibrar","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Anuar","given":"Badrul","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Mokhtar","given":"Salimah","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Gani","given":"Abdullah","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Khan","given":"Ullah","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issued":{"date-parts":

[["2014"]]},"title":"The rise of \"big data\" on cloud computing: Review and open research issues","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}
(Abaker et al., 2014)

Blockchain	A disseminated information structure that is recreated and shared among the individuals from a network. Blockchain is assembled utilizing cryptography. Each block is recognized by its very own cryptographic hash and each block alludes to the hash of the past block. This builds up a connection between the blocks, framing a blockchain.	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"NGITftJW","properties":{"formattedCitation":"(Min, 2019)","plainCitation":"(Min, 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ujEVYHoS","uris":["http://www.mendeley.com/documents/?uuid=c7138a9a-4012-4fa0-afd0-9b7312ebf6c2"],"uri":["http://

www.mendeley.com/documents/?uuid=c7138a9a-4012-4fa0-afd0-9b7312ebf6c2"],"itemData":{"DOI":"10.1016/j.bushor.2018.08.012","ISBN":"15403890","ISSN":"00076813","abstract":"With the soaring value of bitcoin and frenzy over cryptocurrency, the blockchain technology that sparked the bitcoin revolution has received heightened attention from both practitioners and academics. Blockchain technology often causes controversies surrounding its application potential and business ramifications. The blockchain is a peer-to-peer network of information technology that

keeps records of digital asset transactions using distributed ledgers that are free from control by intermediaries such as banks and governments. Thus, it can mitigate risks associated with intermediaries' interventions, including hacking, compromised privacy, vulnerability to political turmoil, costly compliance with government rules and regulation, instability of financial institutions, and contractual disputes. This article unlocks the mystique of blockchain technology and discusses ways to leverage blockchain technology to enhance supply chain resilience in times of increased risks and

uncertainty.","author":[{"dropping-particle":"","family":"Min","given":"Hokey","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Business Horizons","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2019"]]},"page":"35-45","publisher":"\"Kelley School of Business, Indiana University\"","title":"Blockchain technology for enhancing supply chain resilience","type":"article-journal","volume":"62"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Min, 2019)

3DP	It refers to various processes used to synthesize a three-	ADDIN

dimensional object. It uses an abstract digital design file that can be transformed into a physical object by using a 3D printer.

ZOTERO_ITEM CSL_CITATION {"citationID":"qyZ53qOQ","properties":{"formattedCitation":"(Chan et al., 2018; Ghadimi et al., 2018)","plainCitation":"(Chan et al., 2018; Ghadimi et al., 2018)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/wPq4p6aM","uris":["http://www.mendeley.com/documents/?uuid=d98c36dc-a029-460d-a4ce-e87a047d764f"],"uri":["http://www.mendeley.com/documents/?uuid=d98c36dc-a029-460d-a4ce-e87a047d764f"],"itemData":{"DOI":"10.1016/j.cie.2018.10.050","ISBN":"03608352 (ISSN)","ISSN":"03608352","abstract":"Advancements in information and

communication systems offer immense opportunities for supply chain intelligence and autonomy establishing stepping stones for Industry 4.0 supply chains (SCs). As a crucial SC decision, sustainable supplier evaluation and selection process have been addressed abundantly in the previous literature. However, this process has not yet been realized within Industry 4.0 SCs where interconnection, real-time information transparency, technical assistance and decentralization of members of a physical system (i.e., supply chain members) are regarded as the

main design principles. To narrow the identified gap, a Multi-Agent Systems (MASs) approach is proposed for addressing sustainable supplier evaluation and selection process to provide a proper communication channel, structured information exchange and visibility among suppliers and manufacturers. Furthermore, the application of MASs in this process and their natural applicability as one of the enabling technologies in moving towards Industry 4.0 SCs are investigated in detail. It is found that the proposed approach can help decision-makers inside manufacturing firms

to make prompt decisions with less human interactions. The merit of the developed MAS is demonstrated through a real-world implementation on a medical device manufacturer. Finally, the limitations and advantages of the proposed approach are presented together with some remarks for future work.","author":[{"dropping-particle":"","family":"Ghadimi","given":"Pezhman","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Chao","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lim","given":"Ming K.","non-dropping-

particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Heavey","given":"Cathal","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Computers and Industrial Engineering","id":"ITEM-1","issue":"April 2018","issued":{"date-parts":[["2018"]]},"page":"588-600","publisher":"Elsevier","title":"Intelligent sustainable supplier selection using multi-agent technology: Theory and application for Industry 4.0 supply chains","type":"article-journal","volume":"127"}},{"id":"fJ2LYHh2/5jtSShNJ","uris":["http://www.mendeley.com/documents/?uuid=1102baa6-7646-4baa-935a-

fba87179f6d3"],"uri":["http://www.mendeley.com/documents/?uuid=1102baa6-7646-4baa-935a-fba87179f6d3"],"itemData":{"DOI":"10.1016/j.ijpe.2018.09.009","ISSN":"09255273","abstract":"3D Printing (3DP) technology has been receiving increased public attention. Many companies are seeking ways to develop new means of creating and disseminating 3DP content, in order to capture new business opportunities. However, to date the true business opportunities of 3DP have not been completely uncovered. This research explores the challenges posed in the

development and deployment of 3DP and focuses on China, which is still the main manufacturing hub of the world. The main purpose of this research is to uncover the obstacles that resist mass-scale applications of 3DP. By means of empirical semi-structured interviews with 3DP companies in China, it is found that many companies can see the benefits of 3DP, but its potential has not been delivered as promised. One reason is due to the fact that 3DP has not been integrated well in the supply chain. The other reason concerns potential intellectual property issues that cannot effectively prevent counterfeiting. To

tackle the above issues, several areas have been identified that could be improved further. In particular, the legal complications concerning 3D-printed content could be overcome by a licensing platform.","author":[{"dropping-particle":"","family":"Chan","given":"Hing Kai","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Griffin","given":"James","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lim","given":"Jia Jia","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zeng","given":"Fang li","non-dropping-particle":"","parse-

names":false,"suffix":""},{"dropping-particle":"","family":"Chiu","given":"Anthony S.F.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Economics","id":"ITEM-2","issue":"August","issued":{"date-parts":[["2018"]]},"page":"156-162","title":"The impact of 3D Printing Technology on the supply chain: Manufacturing and legal perspectives","type":"article-journal","volume":"205"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Chan et al., 2018; Ghadimi et al.,

		2018)
AR	Extension of physical reality by adding to the real environment layers of any type of information generated by computers.	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"ZY0HZTQC","properties":{"formattedCitation":"(Merlino and Sproge, 2017)","plainCitation":"(Merlino and Sproge, 2017)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/lHvnLCgM","uris":["http://www.mendeley.com/documents/?uuid=e726e3ac-b861-48aa-9c25-de4b4e3ba1d4"],"uri":["http://www.mendeley.com/documents/?uuid=e726e3ac-b861-48aa-9c25-de4b4e3ba1d4"],"itemData":{"DOI":"10.1016/j.proeng.2017.01.053","ISSN":"18777058","abstract":"Supply Chain processes

must augment and change with massive injection of new technologies, robotics, artificial intelligence, big data approach, and contemporarily become more sustainable, considering the growing environmental challenges. This paper explores the main technological changes and the most advanced cases in sustainable Supply Chain. From Materials Handling to Production and Distribution, big data and robotics will change conditions and push further efficiency and customer service levels. After a general overview of the present and future trends in these areas, some practical case and experiences will be

quoted.","author":[{"dropping-particle":"","family":"Merlino","given":"Massimo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Sproge","given":"Ilze","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Procedia Engineering","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"note":"11+23","page":"308-318","title":"The Augmented Supply Chain","type":"article-journal","volume":"178"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}
(Merlino and Sproge, 2017)

CPS	Engineered systems that are built from, and depend upon the seamless integration of computational algorithms and physical component.	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"lF7H1CO1","properties":{"formattedCitation":"(Luthra and Mangla, 2018)","plainCitation":"(Luthra and Mangla, 2018)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/FdmMZ5xw","uris":["http://www.mendeley.com/documents/?uuid=69e94e7e-bdc0-4379-9424-1aabe66a19c6"],"uri":["http://www.mendeley.com/documents/?uuid=69e94e7e-bdc0-4379-9424-1aabe66a19c6"],"itemData":{"DOI":"10.1016/j.psep.2018.04.018","ISSN":"09575820","abstract":"Industry 4.0 initiatives can influence whole business system via

transforming the means the products are designed, produced, delivered and discarded. Industry 4.0 is relatively novel to developing nations, especially in India and needs a clear definition for proper understanding and practice in business. This paper aims to recognize key challenges to Industry 4.0 initiatives and analyze the identified key challenges to prioritize them for effective Industry 4.0 concepts for supply chain sustainability in emerging economies by taking Indian manufacturing industry perspective. Industry 4.0 initiatives can help industries to

incorporate environmental protection and control initiatives as well as process safety measures in supply chains towards sustainable supply chains. However, adoption of Industry 4.0 initiatives is not so easy due to existence of many challenges. Therefore, the present research identifies 18 key challenges to Industry 4.0 initiatives for developing supply chain sustainability using an extensive literature review. These challenges were analyzed through 96 responses received from Indian manufacturing sector using a questionnaire based survey. Explanatory Factor Analysis

results classified identified challenges into four key dimensions of challenges. Analytical Hierarchy Process further ranks the identified dimensions of challenges and related challenges. Findings of the study revealed that Organizational challenges holds the highest importance followed by Technological challenges, Strategic challenges, and Legal and ethical issues. This work is very useful for practitioners, policy makers, regulatory bodies and managers to develop an in-depth understanding of Industry 4.0 initiatives and eradicate the potential challenges in adopting Industry

4.0 initiatives for supply chain sustainability.","author":[{"dropping-particle":"","family":"Luthra","given":"Sunil","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Mangla","given":"Sachin Kumar","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Process Safety and Environmental Protection","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"page":"168-179","publisher":"Institution of Chemical Engineers","title":"Evaluating challenges to Industry 4.0 initiatives for supply chain sustainability in emerging economies","type":"article-

		journal","volume":"117"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Luthra and Mangla, 2018)
Radio-frequency identification (RFID)	Useful to identify and track objects. It consists of an RFID tag that contains the unique identification information of the product, a reader collects the information stored in the tag and a server system stores the data.	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"knnn1PQ6","properties":{"formattedCitation":"(Rodriguez Molano et al., 2017)","plainCitation":"(Rodriguez Molano et al., 2017)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/FPKLXyuM","uris":["http://www.mendeley.com/documents/?uuid=918d06a6-4e74-4922-bf0c-eb6367307ee3"],"uri":["http://www.mendeley.com/documents/?uuid=918d06a6-

4e74-4922-bf0c-eb6367307ee3"],"itemData":{"DOI":"10.12988/ces.2017.711186","abstract":"The following research exposes different tools that bring guidelines to the supply chain to be included in the industry 4.0 and get competitive advantages, showing an architecture proposal that can be adopted by the supply chains immersed in this kind of industry. The methodology used was: first, the revision of the research literature, making an exhaustive and methodical analysis of the proposals, advances, methodologies, future investigations, results and

conclusions obtained. As second, the architecture is proposed, explaining one by one the elements of it. And finally, a mobile application is created in order to validate the proposed architecture. As a result, a validation of the architecture was obtained through a mathematical model that measures the usability of it, in this way, the connection between the sensor layer and the application layer is validated.","author":[{"dropping-particle":"","family":"Rodriguez Molano","given":"Jose Ignacio","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"

Contreras Bravo","given":"Leonardo Emiro","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Trujillo","given":"Edwin Rivas","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Contemporary Engineering Sciences","id":"ITEM-1","issue":"32","issued":{"date-parts":[["2017"]]},"page":"1581-1594","title":"Supply chain architecture model based in the industry 4.0, validated through a mobile application","type":"article-journal","volume":"10"}}],"schema":"https://github.com/citation-style-language/schema/

		raw/master/csl-citation.json"} (Rodriguez Molano et al., 2017)
AI	Concerned the intelligent behaviour in artefacts. It aims to develop machines that can involve perception, reason, learn, communicate and act in a complex environment as human.	

Table AII, 2. SCM 4.0 implementation drivers

Motivations	**References**
Manufacturing improvement	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"rYXWuVTP","properties":{"formattedCitation":"(Chavez et al., 2017; Rodriguez Molano et al., 2017)","plainCitation":"(Chavez et al., 2017; Rodriguez Molano et al., 2017)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/FPKLXyuM","uris":["http://www.mendeley.com/documents/?uuid=918d06a6-4e74-4922-bf0c-eb6367307ee3"],"uri":["http://www.mendeley.com/documents/?uuid=918d06a6-4e74-4922-bf0c-eb6367307ee3"],"itemData":{"DOI":"10.12988/ces.2017.711186","abstract":"The

following research exposes different tools that bring guidelines to the supply chain to be included in the industry 4.0 and get competitive advantages, showing an architecture proposal that can be adopted by the supply chains immersed in this kind of industry. The methodology used was: first, the revision of the research literature, making an exhaustive and methodical analysis of the proposals, advances, methodologies, future investigations, results and conclusions obtained. As second, the architecture is proposed, explaining one by one the elements of it. And finally, a mobile application is created in order to validate the proposed architecture. As a result, a validation of the architecture was obtained through a mathematical model that measures the usability of it, in this way, the connection between the sensor layer and the application layer is validated.","author":[{"dropping-particle":"","family":"Rodriguez Molano","given":"Jose Ignacio","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Contreras Bravo","given":"Leonardo Emiro","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Trujillo","given":"Edwin Rivas","non-dropping-particle":"","parse-

names":false,"suffix":""}],"container-title":"Contemporary Engineering Sciences","id":"ITEM-1","issue":"32","issued":{"date-parts":[["2017"]]},"page":"1581-1594","title":"Supply chain architecture model based in the industry 4.0, validated through a mobile application","type":"article-journal","volume":"10"}},{"id":"fJ2LYHh2/A8jBOkiH","uris":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"uri":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"itemData":{"DOI":"10.1080/09537287.2017.1336788","ISSN":"13665871","abstract":"While recent conceptual research and consultancy white papers have\nsuggested that analysing and interpreting data in the supply chain could\npotentially lead to the creation of competitive advantage, its\nexploratory nature demands empirical investigation. Drawing upon the\nresource-based view, this study empirically investigates the linkages\nbetween data-driven supply chains, manufacturing capability and customer\nsatisfaction. The survey data for this study were gathered from China's\nmanufacturing industry and analysed using structural equation modelling.\

nResults suggest that data-driven supply chains are positively associated\nwith multiple manufacturing capability dimensions (i.e. quality,\ndelivery, flexibility and cost), which in turn, lead to customer\nsatisfaction improvement. While delivery appears to have no significant\neffect on customer satisfaction, quality, flexibility and cost are\nsignificantly and positively associated with customer satisfaction. This\nstudy provides insight into the connection between supply chain big data\nintelligence and both operational and organisational performance\nimprovement.","author":[{"dropping-particle":"","family":"Chavez","given":"Roberto","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Yu","given":"Wantao","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Jacobs","given":"Mark A.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Feng","given":"Mengying","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Production Planning and Control","id":"ITEM-2","issue":"11-12","issued":{"date-parts":[["2017"]]},"page":"906-

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End-to end connectivity	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"lq3qvdFt","properties": {"formattedCitation":"(Raisinghani and Meade, 2005; Sahay and Ranjan, 2008; Schr\\uc0\\u246{}der et al., 2014; Wang and Ha-Brookshire, 2018a)","plainCitation":"(Raisinghani and Meade, 2005; Sahay and Ranjan, 2008; Schröder et al., 2014; Wang and Ha-Brookshire, 2018a)","noteIndex":0},"citationItems": [{"id":"fJ2LYHh2/ffpPmdRV","uris": ["http://www.mendeley.com/documents/?uuid=63a70edd-dc74-4491-9273-3d1b54bc1755"],"uri": ["http://www.mendeley.com/documents/?uuid=63a70edd-dc74-4491-9273-3d1b54bc1755"],"itemData": {"ISBN":"9789984818702","abstract":"Industry 4.0, also mentioned as the fourth industrial revolution is characterized by a new method of controlling the production processes. Through the employment of new technical approaches, like e.g. cloud computing or cyber physical systems, the supply chain becomes more flexible and more transparent. However, supply chain management will be increasingly faced with new challenges. Resulting from modified framework conditions in Industry 4.0 also new types of risks may occur. Therefore, the paper aims

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have generated tremendous opportunities and choices in the marketplace for firms and customers. Competitive pressures have led to sourcing and manufacturing on a global scale resulting in a significant increase in products. The paper tries to identify the need for real time business intelligence (BI) in supply chain analytics.","author":[{"dropping-particle":"","family":"Sahay","given":"B. S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ranjan","given":"Jayanthi","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Information Management and Computer Security","id":"ITEM-2","issue":"1","issued":{"date-parts":[["2008"]]},"page":"28-48","title":"Real time business intelligence in supply chain analytics","type":"article-journal","volume":"16"}},{"id":"fJ2LYHh2/APMX9K53","uris":["http://www.mendeley.com/documents/?uuid=f6582a79-dd5b-4132-8a25-26d659fc059c"],"uri":["http://www.mendeley.com/documents/?uuid=f6582a79-dd5b-4132-8a25-26d659fc059c"],"itemData":{"DOI":"10.1108/13598540510589188","ISBN":"1359854051058","ISSN":"13598546","abstract":"Purpose - To investigate the linkage between

organization performance criteria and the dimensions of agility, e-supply-chain drivers and knowledge management.
Design/methodology/approach - The analytic network process is applied as the research methodology in the context of executive decisions that include qualitative and quantitative attributes. The decision model is presented, along with a case study with an e-supply chain of a global telecommunications company. Findings - The study develops a framework for measuring the relative importance of a particular dimension based on the application of theoretical concepts from the information systems and management science literature to the digital, knowledge economy. Since contextual factors play a critical role in the design of effective knowledge-management (KM) systems, technical and process solutions need to be customized to fit the organization performance criteria, dimensions of agility and supply chain drivers. Research limitations/implications - The model presented is dependent on the perceptual weightings provided by the decision-maker and the generalizability of findings based on our model to other organizations may be limited. Practical implications - This paper addresses the need for a strategic decision-making

tool to assist management in determining which knowledge management construct is most beneficial in the development of an agile supply chain. Originality/value - This paper fulfils an identified information need and offers practical help in a dynamic and competitive environment by providing a decision model that assists in determining which construct of KM is most important based on an organization's performance criteria, dimensions of agility and supply-chain drivers. © Emerald Group Publishing Limited.","author":[{"dropping-particle":"","family":"Raisinghani","given":"Mahesh S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Meade","given":"Laura L.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-3","issue":"2","issued":{"date-parts":[["2005"]]},"page":"114-121","title":"Strategic decisions in supply-chain intelligence using knowledge management: An analytic-network-process framework","type":"article-journal","volume":"10"}},{"id":"fJ2LYHh2/aMmGA9sj","uris":

["http://www.mendeley.com/documents/?uuid=c6f818a5-8312-4774-861c-0e4f791af557"],"uri":["http://www.mendeley.com/documents/?uuid=c6f818a5-8312-4774-861c-0e4f791af557"],"itemData":{"DOI":"10.1080/17543266.2018.1448459","ISBN":"1754-3266","ISSN":"17543274","abstract":"ABSTRACTTo assess today's fashion employers' needs for digital competency, this study explored the employee competency requirements per fashion supply chain function. The content analysis results of 649 job advertisements posted on StyleCareers.com in 2016 showed various digital competency requirements amongst 7 fashion supply chain functions. The initial stages of the fashion business cycle, such as forecasting, consumer research, and design, required a higher level of digital competency from employees than the final stages, such as production/sourcing and retailing/distribution. The finding showed a glimpse of the potential needs for digital intelligence that may be required by each fashion supply chain function to get ready for Industry 4.0. The finding calls for the need to build a framework for Fashion Industry 4.0 competency. This study's results may help employers and employees be

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are used for data storage and retrieval. Each module in the software should use data structures that are appropriate for the types of operations performed in that module. The purpose of this paper is to develop and introduce an efficient data structure for storage and retrieval of data related to capacity of resources. Design/methodology/approach - A major aim of supply management systems is timely production and delivery of products. This paper reviews data structures and designs an efficient data structure for storage and retrieval of data that is used in the scheduling module of SCM software. Findings - This paper introduces a new data structure and search and update algorithms. This data structure can be used in SCM software to record the availability of non-storable resources. Originality/value - This is the first paper that discusses the role of data structures in SCM software and develops a data structure that can be used in the scheduling routine of SCM systems. Scheduling is one of the complex modules of SCM software. Some of the special characteristics related to capacity of resources to develop a data structure that can be efficiently searched and updated as part of scheduling routines were used in the new data structure. This data structure is a modified version of

threaded height-balanced binary search tree. Each node in the proposed tree has one more key than a node in the ordinary threaded height-balanced binary search tree. The available algorithms in the literature on search and update operations on height-balanced binary search trees are modified to suit the proposed tree. © Emerald Group Publishing Limited.","author":[{"dropping-particle":"","family":"Ardalan","given":"Ali","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ardalan","given":"Roya","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Industrial Management and Data Systems","id":"ITEM-2","issue":"1","issued":{"date-parts":[["2009"]]},"page":"138-150","title":"A data structure for supply chain management systems","type":"article-journal","volume":"109"}},{"id":"fJ2LYHh2/VrHhH2BF","uris":["http://www.mendeley.com/documents/?uuid=cfbd7f02-1499-4452-b634-f5602d7ff003"],"uri":["http://www.mendeley.com/documents/?uuid=cfbd7f02-1499-4452-b634-f5602d7ff003"],"itemData":{"ISBN":"0520130138","ISSN":"0520130138","author":[{"dropping-particle":"","family":"Piecyk","given":"Maja Izabela","non-dropping-

particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Bjorklund","given":"Maria","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Physical Distribution & Logistics Management","id":"ITEM-3","issue":"5","issued":{"date-parts":[["2015"]]},"number-of-pages":"459-485","title":"International Journal of Physical Distribution & Logistics Management Article information : To cite this document :","type":"book","volume":"45"}},{"id":"fJ2LYHh2/jnLIoLiT","uris":["http://www.mendeley.com/documents/?uuid=466071c7-234e-4613-ba84-61bed09905cb"],"uri":["http://www.mendeley.com/documents/?uuid=466071c7-234e-4613-ba84-61bed09905cb"],"itemData":{"DOI":"10.1108/IMDS-09-2017-0384","ISSN":"02635577","abstract":"Purpose Since the handling of environmentally sensitive products requires close monitoring under prescribed conditions throughout the supply chain, it is essential to manage specific supply chain risks, i.e. maintaining good environmental conditions, and ensuring occupational safety in the cold environment. The

purpose of this paper is to propose an Internet of Things (IoT)-based risk monitoring system (IoTRMS) for controlling product quality and occupational safety risks in cold chains. Real-time product monitoring and risk assessment in personal occupational safety can be then effectively established throughout the entire cold chain. Design/methodology/approach In the design of IoTRMS, there are three major components for risk monitoring in cold chains, namely: wireless sensor network; cloud database services; and fuzzy logic approach. The wireless sensor network is deployed to collect ambient environmental conditions automatically, and the collected information is then managed and applied to a product quality degradation model in the cloud database. The fuzzy logic approach is applied in evaluating the cold-associated occupational safety risk of the different cold chain parties considering specific personal health status. To examine the performance of the proposed system, a cold chain service provider is selected for conducting a comparative analysis before and after applying the IoTRMS. Findings The real-time environmental monitoring ensures that the products handled within the desired conditions, namely temperature, humidity and

lighting intensity so that any violation of the handling requirements is visible among all cold chain parties. In addition, for cold warehouses and rooms in different cold chain facilities, the personal occupational safety risk assessment is established by considering the surrounding environment and the operators? personal health status. The frequency of occupational safety risks occurring, including cold-related accidents and injuries, can be greatly reduced. In addition, worker satisfaction and operational efficiency are improved. Therefore, it provides a solid foundation for assessing and identifying product quality and occupational safety risks in cold chain activities. Originality/value The cold chain is developed for managing environmentally sensitive products in the right conditions. Most studies found that the risks in cold chain are related to the fluctuation of environmental conditions, resulting in poor product q…","author":[{"dropping-particle":"","family":"Tsang","given":"Y. P.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Choy","given":"K. L.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wu","given":"C. H.","non-dropping-particle":"","parse-

names":false,"suffix":""},{"dropping-particle":"","family":"Ho","given":"G. T.S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lam","given":"Cathy H.Y.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Koo","given":"P. S.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Industrial Management and Data Systems","id":"ITEM-4","issue":"7","issued":{"date-parts":[["2018"]]},"page":"1432-1462","title":"An Internet of Things (IoT)-based risk monitoring system for managing cold supply chain risks","type":"article-journal","volume":"118"}},{"id":"fJ2LYHh2/aMmGA9sj","uris":["http://www.mendeley.com/documents/?uuid=c6f818a5-8312-4774-861c-0e4f791af557"],"uri":["http://www.mendeley.com/documents/?uuid=c6f818a5-8312-4774-861c-0e4f791af557"],"itemData":{"DOI":"10.1080/17543266.2018.1448459","ISBN":"1754-3266","ISSN":"17543274","abstract":"ABSTRACTTo assess today's fashion employers' needs for digital competency, this study explored the employee competency requirements per fashion supply chain function. The

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sold. The final goal is to develop machines having the human intelligence to mimic the decision-making process by humans. However, this does not mean to remove human completely from the production process, but replacing accurate, tireless, and fast machines with humans to optimize the production. This chapter discusses the basic concepts of artificial intelligence techniques and their applications in beverage science and technology.","author":[{"dropping-particle":"","family":"Mohammadi","given":"Vahid","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Minaei","given":"Saeid","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Engineering Tools in the Beverage Industry","id":"ITEM-6","issued":{"date-parts":[["2019"]]},"number-of-pages":"27-63","publisher":"Elsevier Inc.","title":"Artificial Intelligence in the Production Process","type":"book"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Ardalan and Ardalan, 2009; Mohammadi and Minaei, 2019a; Piecyk and Bjorklund, 2015; Schröder et al., 2014; Tsang et al., 2018; Wang

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documents/?uuid=76a79e8c-b5d1-412d-abd3-7f3344a18ea5"],"uri":["http://www.mendeley.com/documents/?uuid=76a79e8c-b5d1-412d-abd3-7f3344a18ea5"],"itemData":{"abstract":"The ongoing discussions about a \" digital revolution— and —disruptive competitive advantagesll have led to the creation of such a business vision as —Industry 4.0ll. Yet, the term and even more its actual impact on businesses is still unclear.This paper addresses this gap and explores more specifically, the consequences and potentials of Industry 4.0 for the procurement, supply and distribution management functions. A blend of literature-based deductions and results from a qualitative study are used to explore the phenomenon.The findings indicate that technologies of Industry 4.0 legitimate the next level of maturity in procurement (Procurement &Supply Management 4.0). Empirical findings support these conceptual considerations, revealing the ambitious expectations.The sample comprises seven industries and the employed method is qualitative (telephone and face-to-face interviews). The empirical findings are only a basis for further quantitative investigation , however, they support the necessity and existence of the maturity level. The

findings also reveal skepticism due to high investment costs but also very high expectations. As recent studies about digitalization are rather rare in the context of single company functions, this research work contributes to the understanding of digitalization and supply management.","author":[{"dropping-particle":"","family":"Glas","given":"Andreas H","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kleemann","given":"Florian C","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Business and Management Invention ISSN","id":"ITEM-2","issue":"6","issued":{"date-parts":[["2016"]]},"page":"55-66","title":"The Impact of Industry 4.0 on procurement and supply management: A conceptual and qualitative analysis","type":"article-journal","volume":"5"}},{"id":"fJ2LYHh2/A8jBOkiH","uris":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"uri":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"itemData":{"DOI":"10.1080/09537287.2017.1336788","ISSN":"13665871","abstract":"Whil

e recent conceptual research and consultancy white papers have\ nsuggested that analysing and interpreting data in the supply chain could\npotentially lead to the creation of competitive advantage, its\ nexploratory nature demands empirical investigation. Drawing upon the\ nresource-based view, this study empirically investigates the linkages\ nbetween data-driven supply chains, manufacturing capability and customer\ nsatisfaction. The survey data for this study were gathered from China's\ nmanufacturing industry and analysed using structural equation modelling.\ nResults suggest that data-driven supply chains are positively associated\ nwith multiple manufacturing capability dimensions (i.e. quality,\ndelivery, flexibility and cost), which in turn, lead to customer\nsatisfaction improvement. While delivery appears to have no significant\neffect on customer satisfaction, quality, flexibility and cost are\nsignificantly and positively associated with customer satisfaction. This\nstudy provides insight into the connection between supply chain big data\nintelligence and both operational and organisational performance\ nimprovement.","author":[{"dropping-particle":"","family":"Chavez","given":"Roberto","non-dropping-particle":"","parse-

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For this, a Systematic Literature Review was conducted, with 77 papers addressing the Cloud Computing-Supply Chain Integration relationship identified for analysis. These papers provide evidence of a positive relationship between the adoption of Cloud Computing use in process/activity integration, technology/system integration, and supply chain partner integration. The reviewed literature also indicates that Cloud Computing use in supply chain can also have an impact on the integration of the supply chain's information, physical and/or financial flows.","author":[{"dropping-particle":"","family":"Lifang Wu Xiaohang Yue Alan Jin David C. Yen","given":"","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Büyüközkan","given":"Gülçin","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Göçer","given":"Fethullah","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Oh","given":"Jisoo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Jeong","given":"Bongju","non-dropping-particle":"","parse-

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Ming-Fang; Bechtsis, Dimitrios; Tsolakis, Naoum; Vlachos, Dimitrios; Srai, Jagjit Singh; Iakovou, Eleftherios; Witkowski, Krzysztof; Wang, Yingli; Han, Jeong Hugh; Beynon-Davies, Paul; Luthra, Sunil; Mangla, Sachin Kumar)\n\nFrom Duplicate 23 (Impact of Sustainability on the supply chain 4.0 performance - Dossou, Paul Eric)\n\n2\n\nFrom Duplicate 110 (Adapting to supply chain 4.0: an explorative study of multinational companies - Makris, Dimitrios; Hansen, Zaza Nadja Lee; Khan, Omera)\n\n10\n\nFrom Duplicate 111 (The Augmented Supply Chain - Merlino, Massimo; Sproge, Ilze)\n\n11+23\n\nFrom Duplicate 112 (How blockchain improves the supply chain: Case study alimentary supply chain - Casado-Vara, Roberto; Prieto, Javier; La Prieta, Fernando De; Corchado, Juan M.)\n\n14\n\nFrom Duplicate 113 (Tactical supply planning in smart manufacturing supply chain - Oh, Jisoo; Jeong, Bongju)\n\n9\n\nFrom Duplicate 114 (Digital Supply Chain: Literature review and a proposed framework for future research - Büyüközkan, Gülçin; Göçer, Fethullah)\n\n3\n\nFrom Duplicate 115 (Smart supply chain management: a review and implications for future research - Lifang Wu Xiaohang Yue Alan Jin David C. Yen)\n\n8","page":"13-39","publisher":"Taylor

& Francis","title":"Supply chain forecasting Collaborative forecasting supports supply chain management Marilyn","type":"article-journal","volume":"0"}},{"id":"fJ2LYHh2/ekkDiElg","uris":["http://www.mendeley.com/documents/?uuid=de81909f-8962-4111-862d-405a481e206a"],"uri":["http://www.mendeley.com/documents/?uuid=de81909f-8962-4111-862d-405a481e206a"],"itemData":{"DOI":"10.1108/09685220810862733","ISSN":"09685227","abstract":"Purpose – Rapid innovation and globalization have generated tremendous opportunities and choices in the marketplace for firms and customers. Competitive pressures have led to sourcing and manufacturing on a global scale resulting in a significant increase in products. The paper tries to identify the need for real time business intelligence (BI) in supply chain analytics.","author":[{"dropping-particle":"","family":"Sahay","given":"B. S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ranjan","given":"Jayanthi","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Information Management and Computer Security","id":"ITEM-4","issue":"1","issued":{"date-parts":

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wireless sensor network; cloud database services; and fuzzy logic approach. The wireless sensor network is deployed to collect ambient environmental conditions automatically, and the collected information is then managed and applied to a product quality degradation model in the cloud database. The fuzzy logic approach is applied in evaluating the cold-associated occupational safety risk of the different cold chain parties considering specific personal health status. To examine the performance of the proposed system, a cold chain service provider is selected for conducting a comparative analysis before and after applying the IoTRMS. Findings The real-time environmental monitoring ensures that the products handled within the desired conditions, namely temperature, humidity and lighting intensity so that any violation of the handling requirements is visible among all cold chain parties. In addition, for cold warehouses and rooms in different cold chain facilities, the personal occupational safety risk assessment is established by considering the surrounding environment and the operators? personal health status. The frequency of occupational safety risks occurring, including cold-related accidents and injuries, can be greatly reduced. In

addition, worker satisfaction and operational efficiency are improved. Therefore, it provides a solid foundation for assessing and identifying product quality and occupational safety risks in cold chain activities. Originality/value The cold chain is developed for managing environmentally sensitive products in the right conditions. Most studies found that the risks in cold chain are related to the fluctuation of environmental conditions, resulting in poor product q…","author":[{"dropping-particle":"","family":"Tsang","given":"Y. P.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Choy","given":"K. L.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wu","given":"C. H.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ho","given":"G. T.S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lam","given":"Cathy H.Y.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Koo","given":"P. S.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Industrial Management and Data Systems","id":"ITEM-

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Alerts and notifications for real-time condition monitoring and predictive maintenance for machine	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"wi2bbvfP","properties":{"formattedCitation":"(Chavez et al., 2017; Rajnai and Kocsis, 2017)","plainCitation":"(Chavez et al., 2017; Rajnai and Kocsis, 2017)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/rtRjQo5h","uris":["http://www.mendeley.com/documents/?uuid=ea285d17-6558-4729-bfae-78cf7f3a81de"],"uri":["http://www.mendeley.com/documents/?uuid=ea285d17-6558-4729-bfae-78cf7f3a81de"],"itemData":{"DOI":"10.1109/SISY.2017.8080580","ISBN":"9781538638552","abstract":"Digitization changes our world. Industry 4.0, the digital transformation of manufacturing changes the labor market. The impacts

of rapid technology development of the fourth industrial revolution present huge challenges for the society and for policy makers. Are we facing reduction of employment by automation rendering human work force uncompetitive with machines? Can creation of new fields of employment, new types of jobs compensate for the loss of traditional labor market requirements?","author":[{"dropping-particle":"","family":"Rajnai","given":"Zoltan","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kocsis","given":"Istvan","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"SISY 2017 - IEEE 15th International Symposium on Intelligent Systems and Informatics, Proceedings","id":"ITEM-1","issued":{"date-parts":[["2017"]]},"page":"343-346","title":"Labor market risks of industry 4.0, digitization, robots and AI","type":"article-journal"}},{"id":"fJ2LYHh2/A8jBOkiH","uris":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"uri":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"itemData":{"DOI":"10.1080/09537287.2017.1336788","ISSN":"13665871","abstract":"While recent conceptual research and

consultancy white papers have\ nsuggested that analysing and interpreting data in the supply chain could\npotentially lead to the creation of competitive advantage, its\ nexploratory nature demands empirical investigation. Drawing upon the\ nresource-based view, this study empirically investigates the linkages\ nbetween data-driven supply chains, manufacturing capability and customer\ nsatisfaction. The survey data for this study were gathered from China's\ nmanufacturing industry and analysed using structural equation modelling.\ nResults suggest that data-driven supply chains are positively associated\ nwith multiple manufacturing capability dimensions (i.e. quality,\ndelivery, flexibility and cost), which in turn, lead to customer\nsatisfaction improvement. While delivery appears to have no significant\neffect on customer satisfaction, quality, flexibility and cost are\nsignificantly and positively associated with customer satisfaction. This\nstudy provides insight into the connection between supply chain big data\nintelligence and both operational and organisational performance\ nimprovement.","author":[{"dropping-particle":"","family":"Chavez","given":"Roberto","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-

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associated with customer satisfaction. This\nstudy provides insight into the connection between supply chain big data\nintelligence and both operational and organisational performance\ nimprovement.","author":[{"dropping-particle":"","family":"Chavez","given":"Roberto","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Yu","given":"Wantao","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Jacobs","given":"Mark A.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Feng","given":"Mengying","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Production Planning and Control","id":"ITEM-1","issue":"11-12","issued":{"date-parts":[["2017"]]},"page":"906-918","publisher":"Taylor & Francis","title":"Data-driven supply chains, manufacturing capability and customer satisfaction","type":"article-journal","volume":"28"}},{"id":"fJ2LYHh2/U0B1GjjI","uris":["http://www.mendeley.com/documents/?uuid=19da59b3-0a49-4562-bb94-8cfd31511577"],"uri":["http://www.mendeley.com/documents/?

uuid=19da59b3-0a49-4562-bb94-8cfd31511577"],"itemData":{"author":[{"dropping-particle":"","family":"Howell","given":"Gelston","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"eeNews Europe","id":"ITEM-2","issued":{"date-parts":[["2017"]]},"page":"3-5","title":"Real-time supply chain management for industry 4.0","type":"article-journal"}},{"id":"fJ2LYHh2/OEVuDojs","uris":["http://www.mendeley.com/documents/?uuid=2c3da7eb-0351-4129-b322-21d60b922401"],"uri":["http://www.mendeley.com/documents/?uuid=2c3da7eb-0351-4129-b322-21d60b922401"],"itemData":{"DOI":"10.1016/B978-0-12-815258-4.00002-0","ISBN":"9780128152584","abstract":"By promoting novel and accurate sensor technologies and progress of computing methods to the forefront of intelligence, the use of smart manufacturing lines has been made possible. Smart manufacturing benefits from artificial intelligence that monitors, analyzes, and makes proper decisions instead of human operators. The seminal smart manufacturing technologies include big data processing capabilities, industrial connectivity devices, and services, as

well as robotic systems. Therefore, it changes the way that products are manufactured, packed, shipped, and sold. The final goal is to develop machines having the human intelligence to mimic the decision-making process by humans. However, this does not mean to remove human completely from the production process, but replacing accurate, tireless, and fast machines with humans to optimize the production. This chapter discusses the basic concepts of artificial intelligence techniques and their applications in beverage science and technology.","author":[{"dropping-particle":"","family":"Mohammadi","given":"Vahid","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Minaei","given":"Saeid","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Engineering Tools in the Beverage Industry","id":"ITEM-3","issued":{"date-parts":[["2019"]]},"number-of-pages":"27-63","publisher":"Elsevier Inc.","title":"Artificial Intelligence in the Production Process","type":"book"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Chavez et al., 2017; Howell, 2017;

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in a retail store. The paper suggests a data mining model which has been used for forecasting of demand. The proposed model has been applied for forecasting demands of eight SKUs for grocery items in a supermarket. Based on the proposed forecasting model, the inventory performance has been studied with simulation. Findings – The proposed forecasting model with the inventory replenishment system results in the reduction of inventory level and increase in customer service level. Hence, the proposed model in the paper","author":[{"dropping-particle":"","family":"Bala","given":"Pradip Kumar","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Modelling in Management","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2012"]]},"page":"23-37","title":"Improving inventory performance with clustering based demand forecasts","type":"article-journal","volume":"7"}},{"id":"fJ2LYHh2/e6Sbkdyj","uris":["http://www.mendeley.com/documents/?uuid=94279119-db11-4b3f-ba0a-fbc8294f303a"],"uri":["http://www.mendeley.com/documents/?uuid=94279119-db11-4b3f-ba0a-fbc8294f303a"],"itemData":{"DOI":"10.1016/

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Nishikant; Ali, Syed Imran; Shukla, Nagesh; Shankar, Ravi; Ounnar, F.; Pujo, P.; Mekaouche, L.; Giambiasi, N.; Scuotto, Veronica; Caputo, Francesco; Villasalero, Manuel; Del Giudice, Manlio; Singh, Akshit; Kumari, Sushma; Malekpoor, Hanif; Mishra, Nishikant; Govindan, Kannan; Cheng, T. C.E.; Mishra, Nishikant; Shukla, Nagesh; Tu, Mengru; Lim, Ming; Yang, Ming-Fang; Bechtsis, Dimitrios; Tsolakis, Naoum; Vlachos, Dimitrios; Srai, Jagjit Singh; Iakovou, Eleftherios; Witkowski, Krzysztof; Wang, Yingli; Han, Jeong Hugh; Beynon-Davies, Paul; Luthra, Sunil; Mangla, Sachin Kumar)\n\nFrom Duplicate 23 (Impact of Sustainability on the supply chain 4.0 performance - Dossou, Paul Eric)\n\n2\n\nFrom Duplicate 110 (Adapting to supply chain 4.0: an explorative study of multinational companies - Makris, Dimitrios; Hansen, Zaza Nadja Lee; Khan, Omera)\n\n10\n\nFrom Duplicate 111 (The Augmented Supply Chain - Merlino, Massimo; Sproge, Ilze)\n\n11+23\n\nFrom Duplicate 112 (How blockchain improves the supply chain: Case study alimentary supply chain - Casado-Vara, Roberto; Prieto, Javier; La Prieta, Fernando De; Corchado, Juan M.)\n\n14\n\nFrom Duplicate 113 (Tactical supply planning in smart manufacturing supply chain - Oh, Jisoo; Jeong, Bongju)\n\n9\n\

nFrom Duplicate 114 (Digital Supply Chain: Literature review and a proposed framework for future research - Büyüközkan, Gülçin; Göçer, Fethullah)\n\n3\n\nFrom Duplicate 115 (Smart supply chain management: a review and implications for future research - Lifang Wu Xiaohang Yue Alan Jin David C. Yen)\n\n8","page":"13-39","publisher":"Taylor & Francis","title":"Supply chain forecasting Collaborative forecasting supports supply chain management Marilyn","type":"article-journal","volume":"0"}},{"id":"fJ2LYHh2/APMX9K53","uris":["http://www.mendeley.com/documents/?uuid=f6582a79-dd5b-4132-8a25-26d659fc059c"],"uri":["http://www.mendeley.com/documents/?uuid=f6582a79-dd5b-4132-8a25-26d659fc059c"],"itemData":{"DOI":"10.1108/13598540510589188","ISBN":"1359854051058","ISSN":"13598546","abstract":"Purpose - To investigate the linkage between organization performance criteria and the dimensions of agility, e-supply-chain drivers and knowledge management.
Design/methodology/approach - The analytic network process is applied as the research methodology in the context of executive decisions that include qualitative and quantitative

attributes. The decision model is presented, along with a case study with an e-supply chain of a global telecommunications company. Findings - The study develops a framework for measuring the relative importance of a particular dimension based on the application of theoretical concepts from the information systems and management science literature to the digital, knowledge economy. Since contextual factors play a critical role in the design of effective knowledge-management (KM) systems, technical and process solutions need to be customized to fit the organization performance criteria, dimensions of agility and supply chain drivers. Research limitations/implications - The model presented is dependent on the perceptual weightings provided by the decision-maker and the generalizability of findings based on our model to other organizations may be limited. Practical implications - This paper addresses the need for a strategic decision-making tool to assist management in determining which knowledge management construct is most beneficial in the development of an agile supply chain. Originality/value - This paper fulfils an identified information need and offers practical help in a dynamic and competitive environment by providing a decision

model that assists in determining which construct of KM is most important based on an organization's performance criteria, dimensions of agility and supply-chain drivers. © Emerald Group Publishing Limited.","author":[{"dropping-particle":"","family":"Raisinghani","given":"Mahesh S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Meade","given":"Laura L.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-3","issue":"2","issued":{"date-parts":[["2005"]]},"page":"114-121","title":"Strategic decisions in supply-chain intelligence using knowledge management: An analytic-network-process framework","type":"article-journal","volume":"10"}},{"id":"fJ2LYHh2/nBxv0Ktp","uris":["http://www.mendeley.com/documents/?uuid=24038fcd-7ffb-4a3a-a462-32e84e9ed809"],"uri":["http://www.mendeley.com/documents/?uuid=24038fcd-7ffb-4a3a-a462-32e84e9ed809"],"itemData":{"DOI":"10.1108/SCM-02-2014-0058","ISBN":"1220130478","ISSN":"13598546","abstract":"Purpose - This

purpose of this paper is to study the impact of innovativeness on supply chain integration (SCI) and supply chain performance (SCP) and the role of SCI in mediating between innovativeness in the supply chain and SCP. Innovativeness is an accepted driver to leverage firm performance. SCI and SCP require innovativeness in the supply chain, but their interrelationships have rarely been researched empirically.\\nP Design/methodology/approach - A questionnaire survey and structural equation modelling were used in this work. After a structural and measurement model was devised from existing supply chain literature, the main data were collected in a web-based questionnaire survey of South Korean manufacturers. Structural equation modelling was applied to test proposed hypotheses on the associations between variables, following a hierarchical analysis process.\\nP Findings - Innovativeness in the supply chain had a positive impact on both SCI and SCP. However, the direct impact of innovativeness on SCP disappeared when the model included SCI as a mediator. In specific, internal and supplier integration fully mediated innovativeness-SCP relationships, whereas customer integration had no

mediating role on those relationships. The findings suggest that innovativeness can influence SCP only when the manufacturer’s level of SCI is sufficiently effective in developing necessary supply chain practices.\\nP Research limitations/implications - In this work, innovativeness in the supply chain effectively influenced SCP through the mediation of SCI. However, cross-sectional analysis in one nation using one response per organisation invites validation embracing other geographical areas and longitudinal studies.\\nP Practical implications - Design of an innovative culture within a firm and along a supply chain can enhance SCI practices by stimulating innovativeness. A high level of SCI should be pursued to effectively transform innovativeness into performance.\\nP Originality/value - This work seminally examines the effect of innovativeness in the supply chain on SCI and SCP as well as the mediating role of SCI in the relationships between innovativeness and SCP. © Emerald Group Publishing Limited.","author":[{"dropping-particle":"","family":"Seo","given":"Young Joon","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Dinwoodie","given":"John","non-dropping-

particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kwak","given":"Dong Wook","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-4","issued":{"date-parts":[["2014"]]},"page":"733-746","title":"The impact of innovativeness on supply chain performance: is supply chain integration a missing link?","type":"article-journal","volume":"19"}},{"id":"fJ2LYHh2/F4lfIzqt","uris":["http://www.mendeley.com/documents/?uuid=f3d20b0f-1722-4c84-97b8-a4804bc33c32"],"uri":["http://www.mendeley.com/documents/?uuid=f3d20b0f-1722-4c84-97b8-a4804bc33c32"],"itemData":{"DOI":"10.1016/j.eswa.2005.07.004","ISSN":"09574174","abstract":"Recent trend in eCommerce applications toward effectively reducing supply chain costs - including spatial, temporal, and monetary resources - has spurred interest among researchers as well as practitioners to efficiently utilize supply chains. One of the least studied of these views is adaptive or dynamic configuration of supply chains. This problem is relatively new since faster

communications over the Internet or by any other means and the willingness to utilize it for effective management of supply chains did not exist a few decades ago. The proposed framework addresses the problem of supply chain configuration. We incorporate machine-learning techniques to develop a dynamically configurable supply chain framework, and evaluate its effectiveness with respect to comparable static supply chains. Specifically, we consider the case where several parts go into the production of a product. A single supplier or a combination of suppliers could supply these parts. The proposed framework automatically forms the supply chain dynamically as per the dictates of incoming orders and the constraints from suppliers upstream. © 2005 Elsevier Ltd. All rights reserved.","author":[{"dropping-particle":"","family":"Piramuthu","given":"Selwyn","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Expert Systems with Applications","id":"ITEM-5","issue":"4","issued":{"date-parts":[["2005"]]},"page":"985-990","title":"Machine learning for dynamic multi-product supply chain formation","type":"article-journal","volume":"29"}],"schema":"http

	s://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Bala, 2012; Lifang Wu Xiaohang Yue Alan Jin David C. Yen et al., 2018; Piramuthu, 2005; Raisinghani and Meade, 2005; Seo et al., 2014)
Increasing employee productivity	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"HOiF0Q4L","properties": {"formattedCitation":"(Kamble et al., 2019)","plainCitation":"(Kamble et al., 2019)","noteIndex":0},"citationItems": [{"id":"fJ2LYHh2/aOEUSMyC","uris": ["http://www.mendeley.com/documents/?uuid=66b7c625-36ec-4388-b7ad-ee5bfe67ef6d"],"uri":["http://www.mendeley.com/documents/?uuid=66b7c625-36ec-4388-b7ad-ee5bfe67ef6d"],"itemData": {"DOI":"10.1016/j.jretconser.2019.02.020","ISSN":"09696989","abstract":"Internet of things (IoT) is estimated to play a significant role in offering tangible and commercial benefits to the supply chains making the operational processes more efficient and productive. IoT system provides the decision-makers with new insights on the value proposition, value creation, helping them to strengthen their bond with the customers and adopt a more effective policy and practices. The food retailing scenario is becoming more complex and flexible

putting pressure on the retailing firms to re-design their marketing strategies incorporating the changing consumer behavior. The IoT is expected to help the retailers in controlling the quality of food products, plan waste management of the items that have exceeded their shelf life, manage the temperature at the store, freezers and other equipment's contributing to the reduction of energy consumption. Despite the vast potential of IoT in food retail supply chains, the adoption of IoT is still in its nascent stage. Therefore, this study attempts to identify the various barriers that affect the adoption of IoT in the retail supply chain in the Indian context and also investigates the inter-dependences between the factors using a two-stage integrated ISM and DEMATEL methodology. Lack of government regulations and poor internet infrastructure were identified to be the significant drivers for IoT adoption.","author":[{"dropping-particle":"","family":"Kamble","given":"Sachin S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Gunasekaran","given":"Angappa","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Parekh","given":"Harsh","non-dropping-particle":"","parse-

names":false,"suffix":""},{"dropping-particle":"","family":"Joshi","given":"Sudhanshu","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Retailing and Consumer Services","id":"ITEM-1","issue":"January","issued":{"date-parts":[["2019"]]},"page":"154-168","publisher":"Elsevier Ltd","title":"Modeling the internet of things adoption barriers in food retail supply chains","type":"article-journal","volume":"48"}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Kamble et al., 2019)

Improving the safety of products and services

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","abstract":"Recent trend in eCommerce applications toward effectively reducing supply chain costs - including spatial, temporal, and monetary resources - has spurred interest among researchers as well as practitioners to efficiently utilize supply chains. One of the least studied of these views is adaptive or dynamic configuration of supply chains. This problem is relatively new since faster communications over the Internet or by any other means and the willingness to utilize it for effective management of supply chains did not exist a few decades ago. The proposed framework addresses the problem of supply chain configuration. We incorporate machine-learning techniques to develop a dynamically configurable supply chain framework, and evaluate its effectiveness with respect to comparable static supply chains. Specifically, we consider the case where several parts go into the production of a product. A single supplier or a combination of suppliers could supply these parts. The proposed framework automatically forms the supply chain dynamically as per the dictates of incoming orders and the constraints from suppliers upstream. © 2005 Elsevier Ltd. All rights reserved.","author":[{"dropping-particle":"","family":"Piramuthu","given":

"Selwyn","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Expert Systems with Applications","id":"ITEM-1","issue":"4","issued":{"date-parts":[["2005"]]},"page":"985-990","title":"Machine learning for dynamic multi-product supply chain formation","type":"article-journal","volume":"29"}},{"id":"fJ2LYHh2/A8jBOkiH","uris":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"uri":["http://www.mendeley.com/documents/?uuid=67746725-5c8c-4b35-9785-a04233f2d224"],"itemData":{"DOI":"10.1080/09537287.2017.1336788","ISSN":"13665871","abstract":"While recent conceptual research and consultancy white papers have\nsuggested that analysing and interpreting data in the supply chain could\npotentially lead to the creation of competitive advantage, its\nexploratory nature demands empirical investigation. Drawing upon the\nresource-based view, this study empirically investigates the linkages\nbetween data-driven supply chains, manufacturing capability and customer\nsatisfaction. The survey data for this study were gathered from China's\nmanufacturing industry and analysed

using structural equation modelling.\nResults suggest that data-driven supply chains are positively associated\nwith multiple manufacturing capability dimensions (i.e. quality,\ndelivery, flexibility and cost), which in turn, lead to customer\nsatisfaction improvement. While delivery appears to have no significant\neffect on customer satisfaction, quality, flexibility and cost are\nsignificantly and positively associated with customer satisfaction. This\nstudy provides insight into the connection between supply chain big data\nintelligence and both operational and organisational performance\nimprovement.","author":[{"dropping-particle":"","family":"Chavez","given":"Roberto","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Yu","given":"Wantao","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Jacobs","given":"Mark A.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Feng","given":"Mengying","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Production Planning and Control","id":"ITEM-2","issue":"11-12","issued":{"date-parts":

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Customer satisfaction	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"amZBXyaH","properties":{"formattedCitation":"(Aryal et al., 2018; Bala, 2012; Lifang Wu Xiaohang Yue Alan Jin David C. Yen et al., 2018; Piramuthu, 2005)","plainCitation":"(Aryal et al., 2018; Bala, 2012; Lifang Wu Xiaohang Yue Alan Jin David C. Yen et al., 2018; Piramuthu, 2005)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/F4lfIzqt","uris":["http://www.mendeley.com/documents/?uuid=f3d20b0f-1722-4c84-97b8-a4804bc33c32"],"uri":["http://www.mendeley.com/documents/?uuid=f3d20b0f-1722-4c84-97b8-a4804bc33c32"],"itemData":{"DOI":"10.1016/j.eswa.2005.07.004","ISSN":"09574174","abstract":"Recent trend in eCommerce applications toward effectively reducing supply chain costs - including spatial, temporal, and

monetary resources - has spurred interest among researchers as well as practitioners to efficiently utilize supply chains. One of the least studied of these views is adaptive or dynamic configuration of supply chains. This problem is relatively new since faster communications over the Internet or by any other means and the willingness to utilize it for effective management of supply chains did not exist a few decades ago. The proposed framework addresses the problem of supply chain configuration. We incorporate machine-learning techniques to develop a dynamically configurable supply chain framework, and evaluate its effectiveness with respect to comparable static supply chains. Specifically, we consider the case where several parts go into the production of a product. A single supplier or a combination of suppliers could supply these parts. The proposed framework automatically forms the supply chain dynamically as per the dictates of incoming orders and the constraints from suppliers upstream. © 2005 Elsevier Ltd. All rights reserved.","author":[{"dropping-particle":"","family":"Piramuthu","given":"Selwyn","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Expert Systems with

Applications","id":"ITEM-1","issue":"4","issued":{"date-parts":[["2005"]]},"page":"985-990","title":"Machine learning for dynamic multi-product supply chain formation","type":"article-journal","volume":"29"}},{"id":"fJ2LYHh2/QrhilpQz","uris":["http://www.mendeley.com/documents/?uuid=f91c2de3-0e7f-4e40-9842-bf9da689740d"],"uri":["http://www.mendeley.com/documents/?uuid=f91c2de3-0e7f-4e40-9842-bf9da689740d"],"itemData":{"DOI":"10.1108/SCM-03-2018-0149","ISSN":"13598546","author":[{"dropping-particle":"","family":"Aryal","given":"Arun","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Liao","given":"Ying","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Nattuthurai","given":"Prasnna","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Li","given":"Bo","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-2","issued":{"date-parts":[["2018"]]},"title":"The emerging big data analytics and IoT in supply chain management: a

systematic review","type":"article-journal"}},{"id":"fJ2LYHh2/LODGH6Pe","uris":["http://www.mendeley.com/documents/?uuid=11e42b63-f911-4765-ae10-8620a29c0c10"],"uri":["http://www.mendeley.com/documents/?uuid=11e42b63-f911-4765-ae10-8620a29c0c10"],"itemData":{"DOI":"10.1108/17465661211208794","ISSN":"17465672","abstract":"Purpose – The purpose of this paper is to develop a forecasting model for retailers based on customer segmentation, to improve performance of inventory. Design/methodology/approach – The research makes an attempt to capture the knowledge of segmenting the customers based on various attributes as an input to the demand forecasting in a retail store. The paper suggests a data mining model which has been used for forecasting of demand. The proposed model has been applied for forecasting demands of eight SKUs for grocery items in a supermarket. Based on the proposed forecasting model, the inventory performance has been studied with simulation. Findings – The proposed forecasting model with the inventory replenishment system results in the reduction of inventory level and increase in customer service level. Hence, the proposed model in the

paper","author":[{"dropping-particle":"","family":"Bala","given":"Pradip Kumar","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Modelling in Management","id":"ITEM-3","issue":"1","issued":{"date-parts":[["2012"]]},"page":"23-37","title":"Improving inventory performance with clustering based demand forecasts","type":"article-journal","volume":"7"}},{"id":"fJ2LYHh2/e6Sbkdyj","uris":["http://www.mendeley.com/documents/?uuid=94279119-db11-4b3f-ba0a-fbc8294f303a"],"uri":["http://www.mendeley.com/documents/?uuid=94279119-db11-4b3f-ba0a-fbc8294f303a"],"itemData":{"DOI":"10.1016/j.proeng.2017.03.197","ISBN":"00207543 (ISSN)","ISSN":"13598546","PMID":"119847662","abstract":"This paper analyzes the current state of research into Cloud Computing and Supply Chain Integration with the objective to identify the findings to date, the areas of study developed and research gaps to provide guidance for future research. For this, a Systematic Literature Review was conducted, with 77 papers addressing the Cloud Computing-Supply Chain Integration relationship

identified for analysis. These papers provide evidence of a positive relationship between the adoption of Cloud Computing use in process/activity integration, technology/ system integration, and supply chain partner integration. The reviewed literature also indicates that Cloud Computing use in supply chain can also have an impact on the integration of the supply chain's information, physical and/or financial flows.","author":[{"dropping-particle":"","family":"Lifang Wu Xiaohang Yue Alan Jin David C. Yen","given":"","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Büyüközkan","given":"Gülçin","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Göçer","given":"Fethullah","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Oh","given":"Jisoo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Jeong","given":"Bongju","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Casado-Vara","given":"Roberto","non-dropping-particle":"","parse-

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Han, Jeong Hugh; Beynon-Davies, Paul; Luthra, Sunil; Mangla, Sachin Kumar)\n\nFrom Duplicate 23 (Impact of Sustainability on the supply chain 4.0 performance - Dossou, Paul Eric)\n\n2\n\nFrom Duplicate 110 (Adapting to supply chain 4.0: an explorative study of multinational companies - Makris, Dimitrios; Hansen, Zaza Nadja Lee; Khan, Omera)\n\n10\n\nFrom Duplicate 111 (The Augmented Supply Chain - Merlino, Massimo; Sproge, Ilze)\n\n11+23\n\nFrom Duplicate 112 (How blockchain improves the supply chain: Case study alimentary supply chain - Casado-Vara, Roberto; Prieto, Javier; La Prieta, Fernando De; Corchado, Juan M.)\n\n14\n\nFrom Duplicate 113 (Tactical supply planning in smart manufacturing supply chain - Oh, Jisoo; Jeong, Bongju)\n\n9\n\nFrom Duplicate 114 (Digital Supply Chain: Literature review and a proposed framework for future research - Büyüközkan, Gülçin; Göçer, Fethullah)\n\n3\n\nFrom Duplicate 115 (Smart supply chain management: a review and implications for future research - Lifang Wu Xiaohang Yue Alan Jin David C. Yen)\n\n8","page":"13-39","publisher":"Taylor & Francis","title":"Supply chain forecasting Collaborative forecasting supports supply chain management Marilyn","type":"article-

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Greater competitiveness	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"UpOgFiYG","properties": {"formattedCitation":"(Bala, 2012; Colicchia, Creazza, No\\uc0\\u232{}, et al., 2019; J., 1994; Piramuthu, 2005; Soni et al., 2019; Tortorella et al., 2019)","plainCitation":"(Bala, 2012; Colicchia, Creazza, Noè, et al., 2019; J., 1994; Piramuthu, 2005; Soni et al., 2019; Tortorella et al., 2019)","noteIndex":0},"citationItems": [{"id":"fJ2LYHh2/F4lfIzqt","uris":["http:// www.mendeley.com/documents/? uuid=f3d20b0f-1722-4c84-97b8-a4804bc33c32"],"uri":["http:// www.mendeley.com/documents/? uuid=f3d20b0f-1722-4c84-97b8-a4804bc33c32"],"itemData": {"DOI":"10.1016/ j.eswa.2005.07.004","ISSN":"09574174 ","abstract":"Recent trend in eCommerce applications toward effectively reducing supply chain costs - including spatial, temporal, and monetary resources - has spurred interest among researchers as well as practitioners to efficiently utilize supply

chains. One of the least studied of these views is adaptive or dynamic configuration of supply chains. This problem is relatively new since faster communications over the Internet or by any other means and the willingness to utilize it for effective management of supply chains did not exist a few decades ago. The proposed framework addresses the problem of supply chain configuration. We incorporate machine-learning techniques to develop a dynamically configurable supply chain framework, and evaluate its effectiveness with respect to comparable static supply chains. Specifically, we consider the case where several parts go into the production of a product. A single supplier or a combination of suppliers could supply these parts. The proposed framework automatically forms the supply chain dynamically as per the dictates of incoming orders and the constraints from suppliers upstream. © 2005 Elsevier Ltd. All rights reserved.","author":[{"dropping-particle":"","family":"Piramuthu","given":"Selwyn","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Expert Systems with Applications","id":"ITEM-1","issue":"4","issued":{"date-parts":[["2005"]]},"page":"985-

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in the reduction of inventory level and increase in customer service level. Hence, the proposed model in the paper","author":[{"dropping-particle":"","family":"Bala","given":"Pradip Kumar","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Modelling in Management","id":"ITEM-2","issue":"1","issued":{"date-parts":[["2012"]]},"page":"23-37","title":"Improving inventory performance with clustering based demand forecasts","type":"article-journal","volume":"7"}},{"id":"fJ2LYHh2/1r3Wevin","uris":["http://www.mendeley.com/documents/?uuid=074f187b-418d-45fd-a6c5-bd63ba32594f"],"uri":["http://www.mendeley.com/documents/?uuid=074f187b-418d-45fd-a6c5-bd63ba32594f"],"itemData":{"abstract":"Juliet W-.","author":[{"dropping-particle":"","family":"J.","given":"WEBSTER","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Strategic Information Systems","id":"ITEM-3","issue":"1","issued":{"date-parts":[["1994"]]},"page":"31-42","title":"Networks of collaboration or conflict? The development of eletronic data interchange","type":"article-

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Design/methodology/approach – The dynamic literature review method called Systematic Literature Network Analysis (SLNA) was adopted. It combines the Systematic Literature Review approach and bibliographic network analyses, and it relies on objective measures and algorithms to perform quantitative literature-based

detection of emerging topics. Findings – The focus of the literature seems to be on threats that are internal to the extended supply chain rather than on external attacks, such as viruses, traditionally related to information technology (IT). The main arising risk appears to be the intentional or non-intentional leakage of information. Also, papers analyze the implications for information sharing coming from “soft” factors such as trust and collaboration among supply chain partners. Opportunities are also highlighted and include how information sharing can be leveraged to confront disruptions and increase resilience. Research limitations/implications – The adopted methodology allows for providing an original perspective on the investigated topic, that is, how information sharing in supply chains and related risks are evolving over time because of the turbulent advances in technology. Practical implications – Emergent and highly critical risks related to information sharing are highlighted to support the design of supply chain risks strategies. Also, critical areas to the development of “beyond-the-dyad” initiatives to manage information sharing risks emerge. Opportunities coming from information sharing that are less known and exploited by companies are provided.

Originality/value – This paper focuses on the supply chain perspective rather than the traditional IT-based view of information sharing. According to this perspective, this paper provides a dynamic representation of the literature on the investigated topic. This is an important contribution to the topic of information sharing in supply chains is continuously evolving and shaping new supply chain models.","author":[{"dropping-particle":"","family":"Colicchia","given":"Claudia","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Creazza","given":"Alessandro","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Noè","given":"Carlo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Strozzi","given":"Fernanda","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-6","issue":"1","issued":{"date-parts":[["2019"]]},"page":"5-21","title":"Information sharing in supply chains: a review of risks and opportunities using the systematic literature network analysis

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of study developed and research gaps to provide guidance for future research. For this, a Systematic Literature Review was conducted, with 77 papers addressing the Cloud Computing-Supply Chain Integration relationship identified for analysis. These papers provide evidence of a positive relationship between the adoption of Cloud Computing use in process/activity integration, technology/system integration, and supply chain partner integration. The reviewed literature also indicates that Cloud Computing use in supply chain can also have an impact on the integration of the supply chain's information, physical and/or financial flows.","author":[{"dropping-particle":"","family":"Lifang Wu Xiaohang Yue Alan Jin David C. Yen","given":"","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Büyüközkan","given":"Gülçin","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Göçer","given":"Fethullah","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Oh","given":"Jisoo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-

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T. C.E.; Mishra, Nishikant; Shukla, Nagesh; Tu, Mengru; Lim, Ming; Yang, Ming-Fang; Bechtsis, Dimitrios; Tsolakis, Naoum; Vlachos, Dimitrios; Srai, Jagjit Singh; Iakovou, Eleftherios; Witkowski, Krzysztof; Wang, Yingli; Han, Jeong Hugh; Beynon-Davies, Paul; Luthra, Sunil; Mangla, Sachin Kumar)\n\nFrom Duplicate 23 (Impact of Sustainability on the supply chain 4.0 performance - Dossou, Paul Eric)\n\n2\n\nFrom Duplicate 110 (Adapting to supply chain 4.0: an explorative study of multinational companies - Makris, Dimitrios; Hansen, Zaza Nadja Lee; Khan, Omera)\n\n10\n\nFrom Duplicate 111 (The Augmented Supply Chain - Merlino, Massimo; Sproge, Ilze)\n\n11+23\n\nFrom Duplicate 112 (How blockchain improves the supply chain: Case study alimentary supply chain - Casado-Vara, Roberto; Prieto, Javier; La Prieta, Fernando De; Corchado, Juan M.)\n\n14\n\nFrom Duplicate 113 (Tactical supply planning in smart manufacturing supply chain - Oh, Jisoo; Jeong, Bongju)\n\n9\n\nFrom Duplicate 114 (Digital Supply Chain: Literature review and a proposed framework for future research - Büyüközkan, Gülçin; Göçer, Fethullah)\n\n3\n\nFrom Duplicate 115 (Smart supply chain management: a review and implications for future research - Lifang Wu Xiaohang Yue

Alan Jin David C. Yen)\n\n8","page":"13-39","publisher":"Taylor & Francis","title":"Supply chain forecasting Collaborative forecasting supports supply chain management Marilyn","type":"article-journal","volume":"0"}},{"id":"fJ2LYHh2/jnLIoLiT","uris":["http://www.mendeley.com/documents/?uuid=466071c7-234e-4613-ba84-61bed09905cb"],"uri":["http://www.mendeley.com/documents/?uuid=466071c7-234e-4613-ba84-61bed09905cb"],"itemData":{"DOI":"10.1108/IMDS-09-2017-0384","ISSN":"02635577","abstract":"Purpose Since the handling of environmentally sensitive products requires close monitoring under prescribed conditions throughout the supply chain, it is essential to manage specific supply chain risks, i.e. maintaining good environmental conditions, and ensuring occupational safety in the cold environment. The purpose of this paper is to propose an Internet of Things (IoT)-based risk monitoring system (IoTRMS) for controlling product quality and occupational safety risks in cold chains. Real-time product monitoring and risk assessment in personal occupational safety can be then effectively established throughout the entire cold chain. Design/methodology/approach

In the design of IoTRMS, there are three major components for risk monitoring in cold chains, namely: wireless sensor network; cloud database services; and fuzzy logic approach. The wireless sensor network is deployed to collect ambient environmental conditions automatically, and the collected information is then managed and applied to a product quality degradation model in the cloud database. The fuzzy logic approach is applied in evaluating the cold-associated occupational safety risk of the different cold chain parties considering specific personal health status. To examine the performance of the proposed system, a cold chain service provider is selected for conducting a comparative analysis before and after applying the IoTRMS. Findings The real-time environmental monitoring ensures that the products handled within the desired conditions, namely temperature, humidity and lighting intensity so that any violation of the handling requirements is visible among all cold chain parties. In addition, for cold warehouses and rooms in different cold chain facilities, the personal occupational safety risk assessment is established by considering the surrounding environment and the operators? personal health status. The frequency

of occupational safety risks occurring, including cold-related accidents and injuries, can be greatly reduced. In addition, worker satisfaction and operational efficiency are improved. Therefore, it provides a solid foundation for assessing and identifying product quality and occupational safety risks in cold chain activities. Originality/value The cold chain is developed for managing environmentally sensitive products in the right conditions. Most studies found that the risks in cold chain are related to the fluctuation of environmental conditions, resulting in poor product q…","author":[{"dropping-particle":"","family":"Tsang","given":"Y. P.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Choy","given":"K. L.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wu","given":"C. H.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ho","given":"G. T.S.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Lam","given":"Cathy H.Y.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Koo","given":"P. S.","non-dropping-particle":"","parse-

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Decrease of risk

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sporadic attention is paid on real data driven SCRM. Most tools and approaches lead to an expert knowledge based SCRM. Due to the arising topic of digitalization in supply chains, leading to Industry 4.0 (I4.0), there is huge potential in building a data driven, smart SCRM. To speed up research in this direction it is worthwhile to define a new research framework giving direction. To create a consistent framework and define smart SCRM in more detail a literature review will take place to select appropriate dimensions like SCRM phases, readiness stages of Digitalization/ I4.0 and SC perspectives describing the degree of SC collaboration. Afterwards the SCRM and I4.0 dimensions will be put into focus describing what impact I4.0 will have on SCRM leading to future requirements. The new framework serves as a basis for future SSCRM research. It helps to categorize research projects through multiple dimensions and to identify potential research gaps. The developed SSCRM requirements framework is a practical tool guiding the requirement specification when designing a company specific SSCRM system.","author":[{"dropping-particle":"","family":"Schlüter","given":"Florian","non-dropping-particle":"","parse-

	names":false,"suffix":""},{"dropping-particle":"","family":"Henke","given":"Michael","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issue":"October","issued":{"date-parts":[["2017"]]},"title":"Smart Supply Chain Risk Management - A Conceptual Framework","type":"article-journal"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Schlüter and Henke, 2017b)
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	before and after applying the IoTRMS. Findings The real-time environmental monitoring ensures that the products handled within the desired conditions, namely temperature, humidity and lighting intensity so that any violation of the handling requirements is visible among all cold chain parties. In addition, for cold warehouses and rooms in different cold chain facilities, the personal occupational safety risk assessment is established by considering the surrounding environment and the operators? personal health status. The frequency of occupational safety risks occurring, including cold-related accidents and injuries, can be greatly reduced. In addition, worker satisfaction and operational efficiency are improved. Therefore, it provides a solid foundation for assessing and identifying product quality and occupational safety risks in cold chain activities. Originality/value The cold chain is developed for managing environmentally sensitive products in the right conditions. Most studies found that the risks in cold chain are related to the fluctuation of environmental conditions, resulting in poor product q…","author":[{"dropping-particle":"","family":"Tsang","given":"Y. P.","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-

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		at investigating the moderating effect of the adoption of Industry 4.0 technologies on the relationship between lean supply chain management (LSCM) practices and supply chain performance improvement in the Brazilian industry.</p>","author":[{"dropping-particle":"","family":"Tortorella","given":"Guilherme","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Miorando","given":"Rogério","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Cawley","given":"Alejandro Francisco","non-dropping-particle":"Mac","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management: An International Journal","id":"ITEM-2","issue":"2","issued":{"date-parts":[["2019"]]},"page":"301-314","title":"The moderating effect of Industry 4.0 on the relationship between lean supply chain management and performance improvement","type":"article-journal","volume":"24"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} (Tortorella et al., 2019; Tsang et al., 2018)
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1 Table AII, 3. SCM 4.0 barriers

Barriers	**References**
Lack of internal knowledge	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"En6MVnjO","properties":{"formattedCitation":"(Horv\\uc0\\u225{}th and Szab\\uc0\\u243{}, 2019; Wang and Ha-Brookshire, 2018b)","plainCitation":"(Horváth and Szabó, 2019; Wang and Ha-Brookshire, 2018b)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/a82fwJVS","uris":["http://www.mendeley.com/documents/?uuid=d5b35c37-4cee-4f6a-ae7a-da3c53653479"],"uri":["http://www.mendeley.com/documents/?uuid=d5b35c37-4cee-4f6a-ae7a-da3c53653479"],"itemData":{"DOI":"10.1080/17543266.2018.1448459","ISBN":"1754-3266","ISSN":"17543274","abstract":"ABSTRACTTo assess today's fashion employers' needs for digital competency, this study explored the employee competency requirements per fashion supply chain function. The content analysis results of 649 job advertisements posted on StyleCareers.com in 2016 showed various digital competency requirements amongst 7 fashion supply chain functions. The initial

stages of the fashion business cycle, such as forecasting, consumer research, and design, required a higher level of digital competency from employees than the final stages, such as production/sourcing and retailing/distribution. The finding showed a glimpse of the potential needs for digital intelligence that may be required by each fashion supply chain function to get ready for Industry 4.0. The finding calls for the need to build a framework for Fashion Industry 4.0 competency. This study's results may help employers and employees be better prepared for the Industry 4.0 and guide the training and education for the future workforce.","author":[{"dropping-particle":"","family":"Wang","given":"Baolu","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ha-Brookshire","given":"Jung E.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Fashion Design, Technology and Education","id":"ITEM-1","issue":"3","issued":{"date-parts":[["2018"]]},"page":"333-342","publisher":"Taylor & Francis","title":"Exploration of Digital

Competency Requirements within the Fashion Supply Chain with an Anticipation of Industry 4.0","type":"article-journal","volume":"11"}},{"id":"fJ2LYHh2/lgiLij7W","uris":["http://www.mendeley.com/documents/?uuid=37a0b2fc-2bfb-49e8-9be4-baad16da7b67"],"uri":["http://www.mendeley.com/documents/?uuid=37a0b2fc-2bfb-49e8-9be4-baad16da7b67"],"itemData":{"DOI":"10.1016/j.techfore.2019.05.021","ISSN":"00401625","abstract":"The Fourth Industrial Revolution poses significant challenges to manufacturing companies from the technological, organizational and management points of view. This paper aims to explore how top executives interpret the concept of Industry 4.0, the driving forces for introducing new technologies and the main barriers to Industry 4.0. The authors applied a qualitative case study design involving 26 semi-structured interviews with leading members of firms, including chief digital officers and chief executive officers. Company websites and annual reports were also examined to increase the reliability and validity of the results. The authors found that

management desire to increase control and enable real-time performance measurement is a significant driving force behind Industry 4.0, alongside production factors. Organizational resistance at both employee and middle management levels can significantly hinder the introduction of Industry 4.0 technologies, though these technologies can also transform management functions. Multinational enterprises have higher driving forces and lower barriers to industry 4.0 than small and medium-sized companies, but these smaller companies have good opportunities, too.","author":[{"dropping-particle":"","family":"Horváth","given":"Dóra","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Szabó","given":"Roland Zs","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Technological Forecasting and Social Change","id":"ITEM-2","issue":"March","issued":{"date-parts":[["2019"]]},"page":"119-132","publisher":"Elsevier","title":"Driving forces and barriers of Industry 4.0: Do multinational and small and medium-sized companies have equal opportunities?","type":"article-

	journal","volume":"146"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Horváth and Szabó, 2019; Wang and Ha-Brookshire, 2018b)
Limited financial resources	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"n2NZRvcD","properties":{"formattedCitation":"(Kumar et al., 2019a; Min, 2019)","plainCitation":"(Kumar et al., 2019a; Min, 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ysQpknAU","uris":["http://www.mendeley.com/documents/?uuid=73c0d8eb-9a08-4d12-955e-67b942b35b65"],"uri":["http://www.mendeley.com/documents/?uuid=73c0d8eb-9a08-4d12-955e-67b942b35b65"],"itemData":{"DOI":"10.1007/978-981-13-8165-2","ISBN":"978-981-13-8164-5","author":[{"dropping-particle":"","family":"Kumar","given":"Kaushik","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zindani","given":"Divya","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Davim","given":"J

. Paulo","non-dropping-particle":"","parse-names":false,"suffix":""}],"id":"ITEM-1","issued":{"date-parts":[["2019"]]},"page":"35-42","title":"Industry 4.0","type":"article-journal","volume":"0"}},{"id":"fJ2LYHh2/ujEVYHoS","uris":["http://www.mendeley.com/documents/?uuid=c7138a9a-4012-4fa0-afd0-9b7312ebf6c2"],"uri":["http://www.mendeley.com/documents/?uuid=c7138a9a-4012-4fa0-afd0-9b7312ebf6c2"],"itemData":{"DOI":"10.1016/j.bushor.2018.08.012","ISBN":"15403890","ISSN":"00076813","abstract":"With the soaring value of bitcoin and frenzy over cryptocurrency, the blockchain technology that sparked the bitcoin revolution has received heightened attention from both practitioners and academics. Blockchain technology often causes controversies surrounding its application potential and business ramifications. The blockchain is a peer-to-peer network of information technology that keeps records of digital asset transactions using distributed ledgers that are free from control by intermediaries such as banks and governments. Thus, it can mitigate risks associated with

	intermediaries' interventions, including hacking, compromised privacy, vulnerability to political turmoil, costly compliance with government rules and regulation, instability of financial institutions, and contractual disputes. This article unlocks the mystique of blockchain technology and discusses ways to leverage blockchain technology to enhance supply chain resilience in times of increased risks and uncertainty.","author":[{"dropping-particle":"","family":"Min","given":"Hokey","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Business Horizons","id":"ITEM-2","issue":"1","issued":{"date-parts":[["2019"]]},"page":"35-45","publisher":"\"Kelley School of Business, Indiana University\"","title":"Blockchain technology for enhancing supply chain resilience","type":"article-journal","volume":"62"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Kumar et al., 2019a; Min, 2019)
Technological immaturity	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"BLCzAmO7","properties":{"formattedCitation":"(Arunachalam et al.,

2018)","plainCitation":"(Arunachalam et al., 2018)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/uf8LzZ2T","uris":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"uri":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"itemData":{"DOI":"10.1016/j.tre.2017.04.001","ISSN":"13665545","abstract":"In the era of Big Data, many organisations have successfully leveraged Big Data Analytics (BDA) capabilities to improve their performance. However, past literature on BDA have put limited focus on understanding the capabilities required to extract value from big data. In this context, this paper aims to provide a systematic literature review of BDA capabilities in supply chain and develop the capabilities maturity model. The paper presents the bibliometric and thematic analysis of research papers from 2008 to 2016. This paper contributes in theorizing BDA capabilities in context of supply chain, and provides future direction of research in this field.","author":[{"dropping-particle":"","family":"Arunachalam","gi

	ven":"Deepak","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kumar","given":"Niraj","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kawalek","given":"John Paul","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Part E: Logistics and Transportation Review","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"page":"416-436","publisher":"Elsevier Ltd","title":"Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice","type":"article-journal","volume":"114"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Arunachalam et al., 2018)
Less familiarity with advanced technologies	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"cdgqWffL","properties":{"formattedCitation":"(Arunachalam et al., 2018)","plainCitation":"(Arunachalam et al., 2018)","noteIndex":0},"citationItems":

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	particle":"","family":"Kumar","given":"Niraj","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kawalek","given":"John Paul","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Part E: Logistics and Transportation Review","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"page":"416-436","publisher":"Elsevier Ltd","title":"Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice","type":"article-journal","volume":"114"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Arunachalam et al., 2018)
Limited access to investment funds	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"Jc4zFfR5","properties":{"formattedCitation":"(Glas and Kleemann, 2016; Xue et al., 2013)","plainCitation":"(Glas and Kleemann, 2016; Xue et al., 2013)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/5cqmF0WW","uris":["http://www.mendeley.com/documents/?uuid=76a79e8c-b5d1-

412d-abd3-7f3344a18ea5"],"uri":["http://www.mendeley.com/documents/?uuid=76a79e8c-b5d1-412d-abd3-7f3344a18ea5"],"itemData":{"abstract":"The ongoing discussions about a \" digital revolution— and —disruptive competitive advantages‖ have led to the creation of such a business vision as —Industry 4.0‖. Yet, the term and even more its actual impact on businesses is still unclear.This paper addresses this gap and explores more specifically, the consequences and potentials of Industry 4.0 for the procurement, supply and distribution management functions. A blend of literature-based deductions and results from a qualitative study are used to explore the phenomenon.The findings indicate that technologies of Industry 4.0 legitimate the next level of maturity in procurement (Procurement &Supply Management 4.0). Empirical findings support these conceptual considerations, revealing the ambitious expectations.The sample comprises seven industries and the employed method is qualitative (telephone and face-to-face interviews). The empirical findings are only a basis for further quantitative investigation , however, they support the necessity and

existence of the maturity level. The findings also reveal skepticism due to high investment costs but also very high expectations. As recent studies about digitalization are rather rare in the context of single company functions, this research work contributes to the understanding of digitalization and supply management.","author":[{"dropping-particle":"","family":"Glas","given":"Andreas H","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kleemann","given":"Florian C","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Business and Management Invention ISSN","id":"ITEM-1","issue":"6","issued":{"date-parts":[["2016"]]},"page":"55-66","title":"The Impact of Industry 4.0 on procurement and supply management: A conceptual and qualitative analysis","type":"article-journal","volume":"5"}},{"id":"fJ2LYHh2/BTEpH6N5","uris":["http://www.mendeley.com/documents/?uuid=6ac57ed0-1ab8-4562-a323-6b7aeecac501"],"uri":["http://www.mendeley.com/documents/?uuid=6ac57ed0-1ab8-4562-a323-

6b7aeecac501"],"itemData":{"DOI":"10.2753/mis0742-1222300110","ISSN":"0742-1222","abstract":"Firms face significant risk when they adopt digital supply chain systems to transact and coordinate with their partners. Drawn upon modular systems theory, this study proposes that system modularity mitigates the risk of adopting digital supply chain systems and therefore motivates firms to digitize more of their supply chain operations. The study theorizes how the risk-mitigating effect of system modularity can be enhanced by the allocation of decision rights to the IT (information technology) unit. The main logic is that IT managers with more domain IT knowledge can better utilize their knowledge in decision making to achieve effective system modularity. We tested these theoretical propositions using a survey study of Chinese companies and found empirical support. We also found that the allocation of decision rights to the IT unit does not directly mitigate the perceived risk of digital supply chain systems, which highlights the role of decision allocation to the IT unit as a key moderator in risk mitigation. The study generates theoretical and practical implications on how IT

governance and system modularity may jointly mitigate risk and foster supply chain digitization.","author":[{"dropping-particle":"","family":"Xue","given":"Ling","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zhang","given":"Cheng","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ling","given":"Hong","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Zhao","given":"Xia","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Journal of Management Information Systems","id":"ITEM-2","issue":"1","issued":{"date-parts":[["2013"]]},"page":"325-352","title":"Risk Mitigation in Supply Chain Digitization: System Modularity and Information Technology Governance","type":"article-journal","volume":"30"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Glas and Kleemann, 2016; Xue et al., 2013)

High investment

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2018; Glas and Kleemann, 2016; Lorite et al., 2017b; Merlino and Sproge, 2017)","plainCitation":"(Aryal et al., 2018; Glas and Kleemann, 2016; Lorite et al., 2017b; Merlino and Sproge, 2017)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/bhiiS7Vh","uris":["http://www.mendeley.com/documents/?uuid=9e8f1b84-7ee9-4d36-9825-8c99048d0c9c"],"uri":["http://www.mendeley.com/documents/?uuid=9e8f1b84-7ee9-4d36-9825-8c99048d0c9c"],"itemData":{"DOI":"10.1016/j.jfoodeng.2016.06.016","ISBN":"0260-8774","ISSN":"02608774","abstract":"In order to reduce food waste and meet the needs of the demanding modern consumer regarding the quality of food items, it is crucial to monitor the supply chain and storage conditions of perishable food products. Considering this scenario, temperature plays an important role on food safety and quality during storage and supply. In this work, a critical temperature indicator (CTI) based on a solvent melting point is developed. Furthermore, the present CTI working principle is improved by the use of microfluidics technology. As final result, a novel and functional

CTI-smart sensor which combines irreversible visual color changes and radio frequency identification (RFID) technologies is achieved. Such CTI integrated to a RFID tag provides a unique advantage to monitor the supply chain in real time by the simple use of a RFID reader in strategic points.","author":[{"dropping-particle":"","family":"Lorite","given":"Gabriela Simone","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Selkälä","given":"Tuula","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Sipola","given":"Teemu","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Palenzuela","given":"Jesús","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Jubete","given":"Elena","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Viñuales","given":"Ana","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Cabañero","given":"Germán","non-dropping-

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documents/?uuid=e726e3ac-b861-48aa-9c25-de4b4e3ba1d4"],"uri":["http://www.mendeley.com/documents/?uuid=e726e3ac-b861-48aa-9c25-de4b4e3ba1d4"],"itemData":{"DOI":"10.1016/j.proeng.2017.01.053","ISSN":"18777058","abstract":"Supply Chain processes must augment and change with massive injection of new technologies, robotics, artificial intelligence, big data approach, and contemporarily become more sustainable, considering the growing environmental challenges. This paper explores the main technological changes and the most advanced cases in sustainable Supply Chain. From Materials Handling to Production and Distribution, big data and robotics will change conditions and push further efficiency and customer service levels. After a general overview of the present and future trends in these areas, some practical case and experiences will be quoted.","author":[{"dropping-particle":"","family":"Merlino","given":"Massimo","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Sproge","given":"Ilze","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-

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4.0). Empirical findings support these conceptual considerations, revealing the ambitious expectations.The sample comprises seven industries and the employed method is qualitative (telephone and face-to-face interviews). The empirical findings are only a basis for further quantitative investigation , however, they support the necessity and existence of the maturity level. The findings also reveal skepticism due to high investment costs but also very high expectations. As recent studies about digitalization are rather rare in the context of single company functions, this research work contributes to the understanding of digitalization and supply management.","author":[{"dropping-particle":"","family":"Glas","given":"Andreas H","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kleemann","given":"Florian C","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Business and Management Invention ISSN","id":"ITEM-3","issue":"6","issued":{"date-parts":[["2016"]]},"page":"55-66","title":"The Impact of Industry 4.0 on procurement and supply

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Limited human resources	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"ssQhfDjO","properties":{"formattedCitation":"(Arunachalam et al., 2018; ElMaraghy, 2019)","plainCitation":"(Arunachalam et al., 2018; ElMaraghy, 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/YRHBfe61","uris":["http://www.mendeley.com/documents/?uuid=0fc87d86-65cd-4c0a-b292-95964d3c14e2"],"uri":["http://www.mendeley.com/documents/?uuid=0fc87d86-65cd-4c0a-b292-95964d3c14e2"],"itemData":{"DOI":"10.1016/j.promfg.2018.12.002","ISSN":"23519789","author":[{"dropping-particle":"","family":"ElMaraghy","given":"Hoda","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Procedia Manufacturing","id":"ITEM-1","issued":{"date-parts":[["2019"]]},"page":"3-9","publisher":"Elsevier B.V.","title":"Smart changeable manufacturing

systems","type":"article-journal","volume":"28"}},{"id":"fJ2LYHh2/uf8LzZ2T","uris":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"uri":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"itemData":{"DOI":"10.1016/j.tre.2017.04.001","ISSN":"13665545","abstract":"In the era of Big Data, many organisations have successfully leveraged Big Data Analytics (BDA) capabilities to improve their performance. However, past literature on BDA have put limited focus on understanding the capabilities required to extract value from big data. In this context, this paper aims to provide a systematic literature review of BDA capabilities in supply chain and develop the capabilities maturity model. The paper presents the bibliometric and thematic analysis of research papers from 2008 to 2016. This paper contributes in theorizing BDA capabilities in context of supply chain, and provides future direction of research in this field.","author":[{"dropping-particle":"","family":"Arunachalam","given":"Deepak","non-dropping-

	particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kumar","given":"Niraj","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kawalek","given":"John Paul","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Part E: Logistics and Transportation Review","id":"ITEM-2","issued":{"date-parts":[["2018"]]},"page":"416-436","publisher":"Elsevier Ltd","title":"Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice","type":"article-journal","volume":"114"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Arunachalam et al., 2018; ElMaraghy, 2019)
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Arunachalam et al., 2018; Wang, Singgih, et al., 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/uf8LzZ2T","uris":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"uri":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"itemData":{"DOI":"10.1016/j.tre.2017.04.001","ISSN":"13665545","abstract":"In the era of Big Data, many organisations have successfully leveraged Big Data Analytics (BDA) capabilities to improve their performance. However, past literature on BDA have put limited focus on understanding the capabilities required to extract value from big data. In this context, this paper aims to provide a systematic literature review of BDA capabilities in supply chain and develop the capabilities maturity model. The paper presents the bibliometric and thematic analysis of research papers from 2008 to 2016. This paper contributes in theorizing BDA capabilities in context of supply chain, and provides future direction of research in this field.","author":[{"dropping-particle":"","family":"Arunachalam","gi

ven":"Deepak","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kumar","given":"Niraj","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kawalek","given":"John Paul","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Part E: Logistics and Transportation Review","id":"ITEM-1","issued":{"date-parts":[["2018"]]},"page":"416-436","publisher":"Elsevier Ltd","title":"Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice","type":"article-journal","volume":"114"}},{"id":"fJ2LYHh2/XssiPA1E","uris":["http://www.mendeley.com/documents/?uuid=602651f0-682c-413c-bd9d-112b66b19c9b"],"uri":["http://www.mendeley.com/documents/?uuid=602651f0-682c-413c-bd9d-112b66b19c9b"],"itemData":{"DOI":"10.1016/j.ijpe.2019.02.002","ISSN":"09255273","abstract":"This research uses sensemaking theory to explore how emerging blockchain technology may

transform supply chains. We investigate three research questions (RQs): What are blockchain technology's perceived benefits to supply chains, where are disruptions mostly likely to occur and what are the potential challenges to further blockchain diffusion? We conducted in-depth interviews with 14 supply chain experts. Cognitive mapping and narrative analysis were deployed as the two main data analysis techniques to aid our understanding and evaluation of people's cognitive complexity in making sense of blockchain technology. We found that individual experts developed different cognitive structures within their own sensemaking processes. After merging individual cognitive maps into a strategic map, we identified several themes and central concepts that then allowed us to explore potential answers to the three RQs. Our study is among the very few to date to explicitly explore how blockchains may transform supply chain practices. Using the sensemaking approach afforded a deeper understanding of how senior executives diagnose the symptoms evident from blockchains and develop assumptions, expectations and knowledge of the technology, which will then shape their future actions

regarding its utilisation. We demonstrate the usefulness of sensemaking theory as an alternative lens in investigating contemporary supply chain phenomena such as blockchains. Bringing sensemaking theory to this discipline in particular enriches emerging behavioural operations research. Our contributions also lie in extending the theories of prospective sensemaking and adding further insights to the stream of technology adoption studies.","author":[{"dropping-particle":"","family":"Wang","given":"Yingli","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Singgih","given":"Meita","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Jingyao","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Rit","given":"Mihaela","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Economics","id":"ITEM-2","issued":{"date-parts":[["2019"]]},"page":"221-236","publisher":"Elsevier B.V.","title":"Making sense of

blockchain technology: How will it transform supply chains?","type":"article-journal","volume":"211"}, {"id":"fJ2LYHh2/UAeANxr8","uris":["http://www.mendeley.com/documents/?uuid=3b4fb49e-a3f8-4ee4-bf13-12aadea221f7"],"uri":["http://www.mendeley.com/documents/?uuid=3b4fb49e-a3f8-4ee4-bf13-12aadea221f7"],"itemData":{"DOI":"10.1016/j.cie.2016.09.023","ISBN":"03608352","ISSN":"03608352","PMID":"119847662","abstract":"Purpose Big data is increasingly becoming a major organizational enterprise force to reckon with in this global era for all sizes of industries. It is a trending new enterprise system or platform which seemingly offers more features for acquiring, storing and analysing voluminous generated data from various sources to obtain value-additions. However, current research reveals that there is limited agreement regarding the performance of “big data.” Therefore, this paper attempts to thoroughly investigate “big data,” its application and analysis in operations or supply-chain management, as well as the trends and perspectives in this research area. This paper is

organized in the form of a literature review, discussing the main issues of “big data” and its extension into “big data II”/IoT–value-adding perspectives by proposing a value-adding framework. Methodology/research approach The research approach employed is a comprehensive literature review. About 100 or more peer-reviewed journal articles/conference proceedings as well as industrial white papers are reviewed. Harzing Publish or Perish software was employed to investigate and critically analyse the trends and perspectives of “big data” applications between 2010 and 2015. Findings/results The four main attributes or factors identified with “big data” include – big data development sources (Variety – V1), big data acquisition (Velocity – V2), big data storage (Volume – V3), and finally big data analysis (Veracity – V4). However, the study of “big data” has evolved and expanded a lot based on its application and implementation processes in specific industries in order to create value (Value-adding – V5) – “Big Data cloud computing perspective/Internet of Things (IoT)”. Hence, the four Vs of “big data” is now expanded into five Vs. Originality/value of research This paper presents original literature

review research discussing “big data” issues, trends and perspectives in operations/supply-chain management in order to propose “Big data II” (IoT – Value-adding) framework. This proposed framework is supposed or assumed to be an extension of “big data” in a value-adding perspective, thus proposing that “big data” be explored thoroughly in order to enable industrial managers and businesses executives to make pre-informed strategic operational and management decisions for increased return-on-investment (ROI). It could also empower organizations with a value-adding stream of information to have a competitive e…","author":[{"dropping-particle":"","family":"Addo-Tenkorang","given":"Richard","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Helo","given":"Petri T.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Computers and Industrial Engineering","id":"ITEM-3","issued":{"date-parts":[["2016"]]},"page":"528-543","publisher":"Elsevier Ltd","title":"Big data applications in operations/supply-chain management: A literature review","type":"article-journal","volume":"101"}],"schema":"

	https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Addo-Tenkorang and Helo, 2016; Arunachalam et al., 2018; Wang, Singgih, et al., 2019)
Complexity of the SC	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"NO6mlOfF","properties":{"formattedCitation":"(Aryal et al., 2018; da Silva et al., 2018)","plainCitation":"(Aryal et al., 2018; da Silva et al., 2018)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/38pFNVSm","uris":["http://www.mendeley.com/documents/?uuid=baba12cd-c6a9-4c3f-9e98-76d6072307f7"],"uri":["http://www.mendeley.com/documents/?uuid=baba12cd-c6a9-4c3f-9e98-76d6072307f7"],"itemData":{"DOI":"10.1080/09537325.2018.1524135","ISBN":"09537325 (ISSN)","ISSN":"14653990","abstract":"In the supply chain oriented to Industrial 4.0 Scenario the scarcity of studies on Technology Transfer (TT) can be easily observed. TT is a fundamental process, because it steers the absorption and dissemination of technologies towards the various stages of supply chain. The objective of this study is to contextualise TT in the supply chain

of Industrial 4.0 Scenario, focusing on the supply, manufacturing industry and final consumer stages. A review of the literature was carried out, using a structured protocol and criteria to compose the bibliographic portfolio. To support the questions presented in this study, the most relevant articles related to the researched topic were thoroughly analyzed. The results infers that in the Industrial 4.0 Scenario, the supply chain will go through changes, such as real-time visibility throughout the entirety of the supply chain, continuous collaboration between the stages of the chain, among other significant changes. © 2018, © 2018 Informa UK Limited, trading as Taylor & Francis Group.","author":[{"dropping-particle":"","family":"Silva","given":"Va nder Luiz","non-dropping-particle":"da","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kovaleski","given":"João Luiz","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Pagani","given":"Regina Negri","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Technology Analysis and Strategic Management","id":"ITEM-1","issue":"0","issued":{"date-parts":

[["2018"]]},"page":"1-17","publisher":"Taylor & Francis","title":"Technology transfer in the supply chain oriented to industry 4.0: a literature review","type":"article-journal","volume":"0"}},{"id":"fJ2LYHh2/QrhilpQz","uris":["http://www.mendeley.com/documents/?uuid=f91c2de3-0e7f-4e40-9842-bf9da689740d"],"uri":["http://www.mendeley.com/documents/?uuid=f91c2de3-0e7f-4e40-9842-bf9da689740d"],"itemData":{"DOI":"10.1108/SCM-03-2018-0149","ISSN":"13598546","author":[{"dropping-particle":"","family":"Aryal","given":"Arun","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Liao","given":"Ying","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Nattuthurai","given":"Prasnna","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Li","given":"Bo","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Supply Chain Management","id":"ITEM-2","issued":{"date-parts":[["2018"]]},"title":"The emerging big data analytics and IoT in supply chain management: a

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Insufficient communication	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"qiI1A50w","properties":{"formattedCitation":"(da Silva et al., 2018; Wang, Singgih, et al., 2019)","plainCitation":"(da Silva et al., 2018; Wang, Singgih, et al., 2019)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/38pFNVSm","uris":["http://www.mendeley.com/documents/?uuid=baba12cd-c6a9-4c3f-9e98-76d6072307f7"],"uri":["http://www.mendeley.com/documents/?uuid=baba12cd-c6a9-4c3f-9e98-76d6072307f7"],"itemData":{"DOI":"10.1080/09537325.2018.1524135","ISBN":"09537325 (ISSN)","ISSN":"14653990","abstract":"In the supply chain oriented to Industrial 4.0 Scenario the scarcity of studies on Technology Transfer (TT) can be easily observed. TT is a fundamental process, because it steers the absorption and dissemination of technologies towards the various stages of supply chain. The objective of this study is to contextualise TT in the supply chain

of Industrial 4.0 Scenario, focusing on the supply, manufacturing industry and final consumer stages. A review of the literature was carried out, using a structured protocol and criteria to compose the bibliographic portfolio. To support the questions presented in this study, the most relevant articles related to the researched topic were thoroughly analyzed. The results infers that in the Industrial 4.0 Scenario, the supply chain will go through changes, such as real-time visibility throughout the entirety of the supply chain, continuous collaboration between the stages of the chain, among other significant changes. © 2018, © 2018 Informa UK Limited, trading as Taylor & Francis Group.","author":[{"dropping-particle":"","family":"Silva","given":"Va nder Luiz","non-dropping-particle":"da","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kovaleski","given":"João Luiz","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Pagani","given":"Regina Negri","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Technology Analysis and Strategic Management","id":"ITEM-1","issue":"0","issued":{"date-parts":

[["2018"]]},"page":"1-17","publisher":"Taylor & Francis","title":"Technology transfer in the supply chain oriented to industry 4.0: a literature review","type":"article-journal","volume":"0"}},{"id":"fJ2LYHh2/XssiPA1E","uris":["http://www.mendeley.com/documents/?uuid=602651f0-682c-413c-bd9d-112b66b19c9b"],"uri":["http://www.mendeley.com/documents/?uuid=602651f0-682c-413c-bd9d-112b66b19c9b"],"itemData":{"DOI":"10.1016/j.ijpe.2019.02.002","ISSN":"09255273","abstract":"This research uses sensemaking theory to explore how emerging blockchain technology may transform supply chains. We investigate three research questions (RQs): What are blockchain technology's perceived benefits to supply chains, where are disruptions mostly likely to occur and what are the potential challenges to further blockchain diffusion? We conducted in-depth interviews with 14 supply chain experts. Cognitive mapping and narrative analysis were deployed as the two main data analysis techniques to aid our understanding and evaluation of people's cognitive complexity in making sense of blockchain technology. We found that

individual experts developed different cognitive structures within their own sensemaking processes. After merging individual cognitive maps into a strategic map, we identified several themes and central concepts that then allowed us to explore potential answers to the three RQs. Our study is among the very few to date to explicitly explore how blockchains may transform supply chain practices. Using the sensemaking approach afforded a deeper understanding of how senior executives diagnose the symptoms evident from blockchains and develop assumptions, expectations and knowledge of the technology, which will then shape their future actions regarding its utilisation. We demonstrate the usefulness of sensemaking theory as an alternative lens in investigating contemporary supply chain phenomena such as blockchains. Bringing sensemaking theory to this discipline in particular enriches emerging behavioural operations research. Our contributions also lie in extending the theories of prospective sensemaking and adding further insights to the stream of technology adoption studies.","author":[{"dropping-particle":"","family":"Wang","given":"Yingli","non-dropping-

	particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Singgih","given":"Meita","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Wang","given":"Jingyao","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Rit","given":"Mihaela","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Production Economics","id":"ITEM-2","issued":{"date-parts":[["2019"]]},"page":"221-236","publisher":"Elsevier B.V.","title":"Making sense of blockchain technology: How will it transform supply chains?","type":"article-journal","volume":"211"}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(da Silva et al., 2018; Wang, Singgih, et al., 2019)
Lack of organizational readiness or technical expertise	ADDIN ZOTERO_ITEM CSL_CITATION {"citationID":"t792yzy1","properties":{"formattedCitation":"(Arunachalam et al., 2018; Min, 2019; Wang and Ha-Brookshire, 2018b)","plainCitation":"(Arunachala

	m et al., 2018; Min, 2019; Wang and Ha-Brookshire, 2018b)","noteIndex":0},"citationItems":[{"id":"fJ2LYHh2/ujEVYHoS","uris":["http://www.mendeley.com/documents/?uuid=c7138a9a-4012-4fa0-afd0-9b7312ebf6c2"],"uri":["http://www.mendeley.com/documents/?uuid=c7138a9a-4012-4fa0-afd0-9b7312ebf6c2"],"itemData":{"DOI":"10.1016/j.bushor.2018.08.012","ISBN":"15403890","ISSN":"00076813","abstract":"With the soaring value of bitcoin and frenzy over cryptocurrency, the blockchain technology that sparked the bitcoin revolution has received heightened attention from both practitioners and academics. Blockchain technology often causes controversies surrounding its application potential and business ramifications. The blockchain is a peer-to-peer network of information technology that keeps records of digital asset transactions using distributed ledgers that are free from control by intermediaries such as banks and governments. Thus, it can mitigate risks associated with intermediaries' interventions, including hacking, compromised privacy, vulnerability to political turmoil, costly compliance with

	government rules and regulation, instability of financial institutions, and contractual disputes. This article unlocks the mystique of blockchain technology and discusses ways to leverage blockchain technology to enhance supply chain resilience in times of increased risks and uncertainty.","author":[{"dropping-particle":"","family":"Min","given":"Hokey","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Business Horizons","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2019"]]},"page":"35-45","publisher":"\"Kelley School of Business, Indiana University\"","title":"Blockchain technology for enhancing supply chain resilience","type":"article-journal","volume":"62"}},{"id":"fJ2LYHh2/uf8LzZ2T","uris":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"uri":["http://www.mendeley.com/documents/?uuid=89b8a5fc-202f-4b76-812d-49a89bb907d6"],"itemData":{"DOI":"10.1016/j.tre.2017.04.001","ISSN":"13665545","abstract":"In the era of Big Data, many organisations have successfully leveraged Big Data Analytics (BDA) capabilities to

	improve their performance. However, past literature on BDA have put limited focus on understanding the capabilities required to extract value from big data. In this context, this paper aims to provide a systematic literature review of BDA capabilities in supply chain and develop the capabilities maturity model. The paper presents the bibliometric and thematic analysis of research papers from 2008 to 2016. This paper contributes in theorizing BDA capabilities in context of supply chain, and provides future direction of research in this field.","author":[{"dropping-particle":"","family":"Arunachalam","given":"Deepak","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kumar","given":"Niraj","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Kawalek","given":"John Paul","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Transportation Research Part E: Logistics and Transportation Review","id":"ITEM-2","issued":{"date-parts":[["2018"]]},"page":"416-436","publisher":"Elsevier Ltd","title":"Understanding big data

	analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice","type":"article-journal","volume":"114"}}, {"id":"fJ2LYHh2/a82fwJVS","uris":["http://www.mendeley.com/documents/?uuid=d5b35c37-4cee-4f6a-ae7a-da3c53653479"],"uri":["http://www.mendeley.com/documents/?uuid=d5b35c37-4cee-4f6a-ae7a-da3c53653479"],"itemData":{"DOI":"10.1080/17543266.2018.1448459","ISBN":"1754-3266","ISSN":"17543274","abstract":"ABSTRACTTo assess today's fashion employers' needs for digital competency, this study explored the employee competency requirements per fashion supply chain function. The content analysis results of 649 job advertisements posted on StyleCareers.com in 2016 showed various digital competency requirements amongst 7 fashion supply chain functions. The initial stages of the fashion business cycle, such as forecasting, consumer research, and design, required a higher level of digital competency from employees than the final stages, such as production/sourcing and retailing/distribution. The finding showed a glimpse of the potential

	needs for digital intelligence that may be required by each fashion supply chain function to get ready for Industry 4.0. The finding calls for the need to build a framework for Fashion Industry 4.0 competency. This study's results may help employers and employees be better prepared for the Industry 4.0 and guide the training and education for the future workforce.","author":[{"dropping-particle":"","family":"Wang","given":"Baolu","non-dropping-particle":"","parse-names":false,"suffix":""},{"dropping-particle":"","family":"Ha-Brookshire","given":"Jung E.","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"International Journal of Fashion Design, Technology and Education","id":"ITEM-3","issue":"3","issued":{"date-parts":[["2018"]]},"page":"333-342","publisher":"Taylor & Francis","title":"Exploration of Digital Competency Requirements within the Fashion Supply Chain with an Anticipation of Industry 4.0","type":"article-journal","volume":"11"}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}(Arunachalam et al.,

	2018; Min, 2019; Wang and Ha-Brookshire, 2018b)